EUROPEAN TELECOMMUNICATION STANDARD

ETS 300 417-2-2

November 1997

Source: TM

Reference: DE/TM-01015-2-2

ICS: 33.020

Key words: ICS, PDH, SDH, STM, transmission, testing

Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 2-2: Synchronous Digital Hierarchy (SDH) and Plesiochronous Digital Hierarchy (PDH) physical section layer functions Implementation Conformance Statement (ICS) proforma specification

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 4 92 94 42 00 - Fax: +33 4 93 65 47 16

Contents

Foreword

This European Telecommunication Standard (ETS) has been produced by the Transmission and Multiplexing (TM) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS provides the Implementation Conformance Statement (ICS) proforma specification to be used in connection with conformance/approval testing of Synchronous Digital Hierarchy (SDH) equipment. It is one of a family of ETSs covering various aspects of SDH equipment standards.

The ICS proforma specification will ultimately consist of 8 sub-parts of ETS 300 417, numbered 1-2 to 8-2, each of which will correspond to sub-parts 1-1 to 8-1 of ETS 300 417, respectively. The ICS sub-parts are:

Part 1-2: ETS 300 417-1-2: "General information about Implementation Conformance Statement (ICS) proforma specification";

Part 2-2: ETS 300 417-2-2: "Synchronous Digital Hierarchy (SDH) and Plesiochronous Digital Hierarchy (PDH) physical section layer functions Implementation Conformance Statement (ICS) proforma specification";

Part 3-2: ETS 300 417-3-2: "STM-N regenerator and multiplex section layer functions Implementation Conformance Statement (ICS) proforma specification";

Part 4-2: ETS 300 417-4-2: "SDH path layer functions Implementation Conformance Statement (ICS) proforma specification";

Part 5-2: ETS 300 417-5-2: "PDH path layer functions Implementation Conformance Statement (ICS) proforma specification";

Part 6-2: ETS 300 417-6-2: "Synchronization layer functions Implementation Conformance Statement (ICS) proforma specification";

Part 7-2: ETS 300 417-7-2: "Auxiliary layer functions Implementation Conformance Statement (ICS) proforma specification";

Part 8-2: ETS 300 417-8-2: "Major compound functions, Implementation Conformance Statement (ICS) proforma specification".

Transposition dates	
Date of adoption:	24 October 1997
Date of latest announcement of this ETS (doa):	28 February 1998
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	31 August 1998
Date of withdrawal of any conflicting National Standard (dow):	31 August 1998

Introduction

To evaluate conformance of a particular implementation, it is necessary to have a statement of which capabilities and options have been implemented for a telecommunication specification. Such a statement is called an Implementation Conformance Statement (ICS).

A client of a test laboratory who requests a conformance/approval test shall provide to the test laboratory a completed ICS proforma for each layer to be tested and a detailed system description of the implementation.

The ICS proforma is not another complete description of the related specification, but rather a compact form of its static conformance requirements, to be used by the test laboratory to identify which test shall be performed on a given implementation. Not every feature of a profile specification is contained in the related ICS proforma. For particular cases requiring specific information the ICS can refer to the appropriate clause of the related specification by means of references, notes and or comments.

The ICS proforma captures the implementation flexibility allowed by the related specification and details which option are left to the implementor, which are conditionally dependent on other option taken by the implementor.

1 Scope

This European Telecommunication Standard (ETS) provides the Implementation Conformance Statement (ICS) proforma specification for the Synchronous Digital Hierarchy (SDH) equipment physical section layer functions defined in ETS 300 417-2-1 [2] in compliance with the relevant requirements, and in accordance with the relevant guidance given in ISO/IEC 9646-7 [7] and ETS 300 406 [3].

2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] ETS 300 417-1-1 (1996): "Transmission and Multiplexing (TM); Generic functional requirements for SDH equipment; Generic processes and performance".

[2] ETS 300 417-2-1 (1996): "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment: SDH and PDH Physical section layer functions".

[3] ETS 300 406 (1995): "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

[4] ETS 300 232: "Transmission and Multiplexing (TM); Optical interfaces for equipments and systems relating to the Synchronous Digital Hierarchy [ITU-T Recommendation G.957 (1993) modified]".

[5] ITU-T Recommendation G.957 (1993): "Optical interfaces for equipments and systems relating to the synchronous digital hierarchy".

[6] ISO/IEC 9646-1 (1994): "Information technology - Open systems interconnection - Conformance testing methodology and framework - Part 1: General concepts".

[7] ISO/IEC 9646-7 (1995): "Information technology - Open systems interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".

[8] CCITT Recommendation G.703 (1991): "Physical/electrical characteristics of hierarchical digital interfaces".

[9] CCITT Recommendation G.704 (1991): "Synchronous frame structures used at primary and secondary hierarchical levels".

[10] CCITT Recommendation G.751 (1988): "Digital multiplex equipments operating at third order bit rate of 34 368 kbit/s and fourth order bit rate of 139 264 kbit/s and using positive justification".

[11] ITU-T Recommendation G.823 (1993): "The control of jitter and wander within digital networks which are based on the 2 048 kbit/s hierarchy".

[12] ITU-T Recommendation G.825 (1993): "The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH)".

[13] ITU-T Recommendation G.958 (1993): "Digital line systems based on the synchronous digital hierarchy for use on optical fibre cables".

[14] ETS 300 167 (1993): "Transmission and Multiplexing (TM); Functional characteristics of 2 048 kbit/s interfaces".

[15] ETS 300 337 (1993): "Transmission and Multiplexing (TM); Generic frame structures for the transport of various signals (including Asynchronous Transfer Mode (ATM) cells and Synchronous Digital Hierarchy (SDH) elements) at the CCITT Recommendation G.702 hierarchical rates of 2 048 kbit/s, 34 368 kbit/s and 139 264 kbit/s".

[16] ETS 300 166 (1993): "Transmission and Multiplexing (TM); Physical and electrical characteristics of hierarchical digital interfaces for equipment using the 2 048 kbit/s - based plesiochronous or synchronous digital hierarchies".

[17] prETS 300 417-6-1 (1997): "Transmission and Multiplexing (TM); Generic functional requirements for Synchronous Digital Hierarchy (SDH) equipment; Part 6-1: Synchronization distribution layer functions".

[18] ITU-T Recommendation G.652 (1993): "Characteristics of a single-mode optical fibre cable".

[19] ITU-T Recommendation G.653 (1993): "Characteristics of a dispersion-shifted single-mode optical fibre cable".

[20] ITU-T Recommendation G.654 (1993): "Characteristics of a 1550 nm wavelength loss-minimized single-mode optical fibre cable".

[21] ITU-T Recommendation G.742 (1988): "Second order digital multiplex equipment operating at 8448 kbit/s and using positive justification".

[22] ITU-T Recommendation G.706 (1991): "Frame alignment and cyclic redundancy check (CRC) procedures relating to basic frame structures defined in Recommendation G.704".

[23] prETS 300 417-6-2: "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 6-2: Synchronization layer functions Implementation Conformance Statement (ICS) proforma specification".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply:

- terms defined in ETS 300 417-2-1 [2];
- terms defined in ISO/IEC 9646-1 [6] and in ISO/IEC 9646-7 [7].

In particular, the following terms defined in ISO/IEC 9646-1 [6] apply:

Implementation Conformance Statement (ICS): A statement made by the supplier of an implementation or system claimed to conform to a given specification, stating which capabilities have been implemented. The ICS can take several forms: protocol ICS, profile ICS, profile specific ICS, information object ICS, etc.

ICS proforma: A document, in the form of a questionnaire, which when completed for an implementation or system becomes an ICS.

3.2 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

A	Adaptation function
AI	Adapted Information
AIS	Alarm Indication Signal
BER	Bit Error Ratio
C	Connection function
CI	Characteristic Information
CID	Consecutive Identical Digits

CMI	Coded Mark Inversion
CP	Connection Point
D	Data
EMF	Equipment Management Function
EMS	Equipment Management System
E0	Electrical interface signal 64 kbit/s
E12	Electrical interface signal 2 048 kbit/s
E22	Electrical interface signal 8 448 kbit/s
E31	Electrical interface signal 34 368 kbit/s
E4	Electrical interface signal 139 264 kbit/s
ES1	STM-1 electrical interface signal 155 520 kbit/s
EX	EXtinction ratio
FAS	Frame Alignment Signal
FS	Frame Start
HDB3	High Density Bipolar of order 3
IF	In Frame
ICS	Implementation Conformance Statement
ID	IDentifier
IUT	Implementation Under Test
LED	Light Emitting Diode
LOF	Loss Of Frame
LOS	Loss Of Signal
MI	Management Information
MLM	Multi-Longitudinal Mode (laser)
MON	MONitored
N_B	Near-end Block
NE	Network Element
NMON	Not MONitored
OFS	Out of Frame Second
OOF	Out Of Frame state
OS	Optical Section
OS1	STM-1 Optical Section
OS4	STM-4 Optical Section
OS16	STM-16 Optical Section
P0s	64 kbit/s layer (transparent)
P12s	2 048 kbit/s PDH path layer with synchronous 125 µs frame structure according to ETS 300 167 [14]
P12x	2 048 kbit/s layer (transparent)
P22e	8 448 kbit/s PDH path layer with 4 plesiochronous 2 048 kbit/s
P22x	8 448 kbit/s layer (transparent)
P31e	34 368 kbit/s PDH path layer with 4 plesiochronous 8 448 kbit/s
P31s	34 368 kbit/s PDH path layer with synchronous 125 µs frame structure according to ETS 300 337 [15]
P31x	34 368 kbit/s layer (transparent)
P4e	139 264 kbit/s PDH path layer with 4 plesiochronous 34 368 kbit/s
P4s	139 264 kbit/s PDH path layer with synchronous 125 µs frame structure according to ETS 300 337 [15]
P4x	139 264 kbit/s layer (transparent)
PDH	Plesiochronous Digital Hierarchy
QL	Quality Level
RS	Regenerator Section
RS1	STM-1 Regenerator Section
RS4	STM-4 Regenerator Section
RS16	STM-16 Regenerator Section
SEC	SDH Equipment Clock
SCS	System Conformance Statement
SD	Synchronization Distribution layer
SDH	Synchronous Digital Hierarchy
Sk	Sink
SLM	Single-Longitudinal Mode (laser)
So	Source
SQLCH	SQueLCH
SSD	Server Signal Degrade

SSF	Server Signal Fail
SSU	Synchronization Supply Unit
STM	Synchronous Transport Module
STM-N	Synchronous Transport Module, level N
SUT	System Under Test
T12	2 048 kHz signal
TI	Timing Information
TSD	Trail Signal Degrade
TSF	Trail Signal Fail
TT	Trail Termination function
UI	Unit Interval

4 Conformance to this ICS proforma specification

If it claims to conform to this ETS, the actual ICS proforma to be filled in by a supplier shall be technically equivalent to the text of the ICS proforma given in the annexes of this ETS, and shall preserve the numbering/naming and ordering of the proforma items.

An ICS which conforms to this ETS shall be a conforming ICS proforma completed in accordance with the instructions for completion given in clause A.1.

For each layer instance, it is necessary to fill a separate ICS proforma depending on the layer instance.

Annex A (normative): ICS proforma for ETS 300 417-2-1

A.1 Guidance for completing the ICS proforma

A.1.1 Purposes and structure

The purpose of this ICS proforma is to provide a mechanism whereby a supplier of an implementation of the requirements defined in ETS 300 417-2-1 [2] may provide information about the implementation in a standardized manner.

The ICS proformas in the following annexes are subdivided into subclauses each containing the following categories of information:

- identification of the implementation;
- identification of the ETS;
- global statement of conformance.

A.1.2 Abbreviations and conventions

The ICS proforma contained in the annexes of this ETS is comprised of information in tabular form in accordance with the guidelines presented in ISO/IEC 9646-7 [7].

Item column

The item column contains a number which identifies the item in the table.

Item description column

The item description column describes in free text each respective item (e.g. parameters, timers, etc.). It implicitly means "is <item description> supported by the implementation?".

Status column

The following notations, defined in ISO/IEC 9646-7 [7], are used for the status column:

m	mandatory - the capability is required to be supported.
o	optional - the capability may be supported or not.
n/a	not applicable - in the given context, it is impossible to use the capability.
x	prohibited (excluded) - there is a requirement not to use this capability in the given context.
o.i	qualified optional - for mutually exclusive or selectable options from a set. "i" is an integer which identifies an unique group of related optional items and the logic of their selection which is defined immediately following the table.
ci	conditional - the requirement on the capability ("m", "o", "x" or "n/a") depends on the support of other optional or conditional items. "i" is an integer identifying an unique conditional status expression which is defined immediately following the table. For nested conditional expressions, the syntax "IF ... THEN (IF ... THEN ... ELSE...) ELSE ..." shall be used to avoid ambiguities.

Reference column

The reference column gives reference to ETS 300 417-2-1 [2], except where explicitly stated otherwise.

Support column

The support column shall be filled in by the supplier of the implementation. The following common notations, defined in ISO/IEC 9646-7 [7], are used for the support column:

Y or y	supported by the implementation;
N or n	not supported by the implementation;
N/A, n/a or -	no answer required (allowed only if the status is n/a, directly or after evaluation of a conditional status).

If this ICS proforma is completed in order to describe a multiple-profile support in a system, it is necessary to be able to answer that a capability is supported for one profile and not supported for another. In that case, the supplier shall enter the unique reference to a conditional expression, preceded by "?" (e.g. ?3). This expression shall be given in the cell provided at the bottom of the table. It uses predicates defined in the System Conformance Statement (SCS), each of which refers to a single profile and which takes the value TRUE if and only if that profile is to be used.

EXAMPLE 1: ?3: IF prof1 THEN Y ELSE N

It is also possible to provide a comment to an answer in the space provided at the bottom of the table.

Values allowed column

The values allowed column contains the values or the ranges of values allowed.

Values supported column

The values supported column shall be filled in by the supplier of the implementation. In this column, the values or the ranges of values supported by the implementation shall be indicated.

Mnemonic column

The mnemonic column contains mnemonic identifiers for each item.

References to items

For each possible item answer (answer in the support column) within the ICS proforma exists a unique reference, used, for example, in the conditional expressions. It is defined as the table identifier, followed by a solidus character "/", followed by the item number in the table. If there is more than one support column in a table, the columns shall be discriminated by letters (a, b, etc.), respectively.

EXAMPLE 2: C.5/4 is the reference to the answer of item 4 in table 5 of annex C.

EXAMPLE 3: C.6/3b is the reference to the second answer (i.e. in the second support column) of item 3b in table 6 of annex C.

Prerequisite line

A prerequisite line takes the form: Prerequisite: <predicate>.

A prerequisite line after a clause or table title indicates that the whole clause or the whole table is not required to be completed if the predicate is FALSE.

A.1.3 Instructions for completing the ICS proforma

The supplier of the implementation shall complete the ICS proforma in each of the spaces provided. However, the tables containing in "user role" subclause shall only be completed for user implementations, and the tables containing in "network role" subclause shall only be completed for network implementations. If necessary, the supplier may provide additional comments separately.

More detailed instructions are given at the beginning of the different subclauses of the ICS proforma.

Annex B (normative): ICS proforma for STM-1 optical section layer

B.1 Identification of the implementation

In this ETS, an Implementation Under test (IUT), and of course the identification of an IUT refers to an STM-1 Optical Section (OS1) layer instance implemented inside the System Under Test (SUT).

Identification of the IUT and the SUT in which it resides should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the ICS should be named as the contact person.

B.1.1 Date of the statement

.....

B.1.2 IUT identification

IUT name:

.....

.....

IUT version

Hardware version:

.....

Software version:

.....

Firmware version:

.....

B.1.3 SUT identification

SUT name:

.....

.....

Hardware configuration:

.....

SUT Software version:

.....

SUT Firmware version:

.....

Operating system:

.....

B.1.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

B.1.5 Client

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

B.1.6 ICS contact person

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

B.2 Identification of the ETS

This ICS proforma applies to the following standard:

ETS 300 417-2-1 [2]: "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment : SDH and PDH physical section layer functions".

B.3 Global statement of conformance of OS1 layer

Are all mandatory capabilities implemented (Yes/No) .....

NOTE: Answering "No" to this question indicates non-conformance to the ETS specification. Non-supported mandatory capabilities are to be identified in the ICS, with an explanation of why the implementation is non-conforming, on pages attached to the ICS proforma.

Answering "Yes" to this question indicates only that all the capabilities with the explicit status "m" are supported. It is not necessary to fill in the support column of the associated item.

B.4 OS1 layer description

Table B.1: OS1 optical section layer function

Item	OS1 optical section layer function	Reference	Status	Support
1	The OS1 Section Layer supports an OS1 Optical Section Connection Function (OS1_C).	4.1	o	
2	The OS1 Section Layer contains an OS1 Trail Termination Source function (OS1_TT_So).	4.2.1	o.101	
3	The OS1 Section Layer contains an OS1 Trail Termination Sink function (OS1_TT_Sk).	4.2.2	o.101	
4	The OS1 Section Layer contains an OS1 Section to RS1 (Regenerator Section) Adaptation Source function (OS1/RS1_A_So).	4.3.1	c101	
5	The OS1 Section Layer contains an OS1 Section to RS1 Adaptation Sink function (OS1/RS1_A_Sk).	4.3.2	c102	

o.101: It is mandatory to support at least one of these items -- at least one TT function present
c101 : IF B.1/2 THEN m ELSE x -- a TT_So function should exist for A_So function
c102 : IF B.1/3 THEN m ELSE x -- a TT_Sk function should exist for A_Sk function

Table B.2: OS1 optical interface classification

Prerequisite: B.1/2 -- OS1_TT_So present

Item	OS1 optical interface classification	Reference	Status	Support
1	The Trail Termination Source supports an Intra-office (I1) application (OS1-I1_TT_So).	table 1 of G.957 [5], ETS 300 232 [4]	o.201	
2	The Trail Termination Source supports an Inter-office Short-haul with Source nominal wavelength of 1 310 nm (S1.1) application (OS1-S1.1_TT_So).	table 1 of G.957 [5], ETS 300 232 [4]	o.201	
3	The Trail Termination Source supports an Inter-office Short-haul with Source nominal wavelength of 1 550 nm (S1.2) application (OS1-S1.2_TT_So).	table 1 of G.957 [5], ETS 300 232 [4]	o.201	
4	The Trail Termination Source supports an Inter-office Long-haul with Source nominal wavelength of 1 310 nm (L1.1) application (OS1-L1.1_TT_So).	table 1 of G.957 [5], ETS 300 232 [4]	o.201	
5	The Trail Termination Source supports an Inter-office Long-haul with Source nominal wavelength of 1 550 nm on optical fibre complying with ITU-T Recommendations G.652 [18]/G.654 [20] (L1.2) application (OS1-L1.2_TT_So).	table 1 of G.957 [5], ETS 300 232 [4]	o.201	
6	The Trail Termination Source supports an Inter-office Long-haul with Source nominal wavelength of 1 550 nm on optical fibre complying with ITU-T Recommendation G.653 [19] (L1.3) application (OS1-L1.3_TT_So).	table 1 of G.957 [5], ETS 300 232 [4]	o.201	

o.201: It is mandatory to support exactly one of these items

Table B.3: OS1 optical interface source type

Prerequisite: B.1/2 -- OS1_TT_So present

Item	OS1 optical interface source type	Reference	Status	Support
1	The source type is a Light Emitting Diode (LED).	table 4 of G.957 [5], ETS 300 232 [4]	c301	
2	The source type is a Single-Longitudinal Mode laser (SLM).	table 4 of G.957 [5], ETS 300 232 [4]	c302	
3	The source type is a Multi-Longitudinal Mode laser (MLM).	table 4 of G.957 [5], ETS 300 232 [4]	c303	

c301: IF B.2/1 THEN o.301 ELSE x
c302: IF B.2/3 OR B.2/4 OR B.2/5 OR B.2/6 THEN o.301 ELSE x
c303: IF B.2/1 OR B.2/2 OR B.2/3 OR B.2/4 OR B.2/6 THEN o.301 ELSE x
o.301: It is mandatory to support exactly one of these items

B.5 OS1 layer transmission tables

B.5.1 OS1 source operating wavelength range, OS1_TT_So

Table B.4: OS1 source operating wavelength range

Prerequisite: B.1/2 -- OS1_TT_So present

Item	OS1 source operating wavelength range	Reference	Status	Support
1	The source wavelength range is within 1 260 and 1 360 nm (OS1-I1_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c401	
2	The source wavelength range is within 1 261 and 1 360 nm (OS1-S1.1_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c402	
3	The source wavelength range is within 1 430 and 1 576 nm (OS1-S1.1_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c403	
4	The source wavelength range is within 1 430 and 1 580 nm (OS1-S1.2_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c404	
5	The source wavelength range is within 1 280 and 1 335 nm (OS1-L1.1_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c405	
6	The source wavelength range is within 1 534 and 1 566 nm (OS1-L1.3_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c406	
7	The source wavelength range is within 1 523 and 1 577 nm (OS1-L1.3_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c406	
8	The source wavelength range is within 1 480 and 1 580 nm (OS1-L1.2_TT_So, OS1-L1.3_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c407	

c401: IF B.2/3 AND (B.3/1 OR B.3/3) THEN o.401 ELSE x
c402: IF B.2/2 AND B.3/3 THEN o.401 ELSE x
c403: IF B.2/6 AND B.3/3 THEN o.401 ELSE x
c404: IF B.2/3 AND B.3/2 THEN o.401 ELSE x
c405: IF B.2/4 AND (B.3/2 OR B.3/3) THEN o.401 ELSE x
c406: IF B.2/6 AND B.3/2 THEN o.401 ELSE x
c407: IF (B.2/5 OR B.2/6) AND B.3/2 THEN o.401 ELSE x
o.401: It is mandatory to support exactly one of these items

B.5.2 OS1 source spectral characteristics, OS1_TT_So

Table B.5: OS1 source spectral characteristics

Prerequisite: B.1/2 -- OS1_TT_So present

Item	OS1 source spectral characteristics	Reference	Status	Support
1	The maximum RMS width under standard operating conditions -measured as the standard deviation of the spectral distribution taking into account all modes that are not more than 20 dB down from the peak mode- is 40 nm (OS1-I1_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c501	
2	The maximum RMS width under standard operating conditions -measured as the standard deviation of the spectral distribution taking into account all modes that are not more than 20 dB down from the peak mode- is 80 nm (OS1-I1_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c502	
3	The maximum RMS width under standard operating conditions -measured as the standard deviation of the spectral distribution taking into account all modes that are not more than 20 dB down from the peak mode- is 7,7 nm (OS1-S1.1_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c503	
4	The maximum RMS width under standard operating conditions -measured as the standard deviation of the spectral distribution taking into account all modes that are not more than 20 dB down from the peak mode- is 2,5 nm (OS1-S1.2_TT_So, OS1-L1.3_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c504	
5	The maximum RMS width under standard operating conditions -measured as the standard deviation of the spectral distribution taking into account all modes that are not more than 20 dB down from the peak mode- is 4 nm (OS1-L1.1_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c505	
6	The maximum RMS width under standard operating conditions -measured as the standard deviation of the spectral distribution taking into account all modes that are not more than 20 dB down from the peak mode- is 3 nm (OS1-L1.3_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c506	
7	The full width of the central wavelength peak, measured under standard operating conditions 20 dB down from the maximum amplitude of the central wavelength, is not more than 1 nm (OS1-L1.2_TT_So, OS1-L1.3_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c507	
8	The side mode suppression ratio -defined as the relative amplitude of the lateral peaks to the central wavelength peak- is at least 30 dB (OS1-L1.2_TT_So, OS1-L1.3_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c507	

c501: IF B.2/1 AND B.3/3 THEN o.501 ELSE x
c502: IF B.2/1 AND B.3/1 THEN o.501 ELSE x
c503: IF B.2/2 AND B.3/3 THEN o.501 ELSE x
c504: IF (B.2/3 AND B.3/3) OR (B.2/6 AND B.3/3 AND B.4/7) THEN o.501 ELSE x
c505: IF B.2/4 AND B.3/3 THEN o.501 ELSE x
c506: IF B.2/6 AND B.3/3 AND B.4/6 THEN o.501 ELSE x
c507: IF (B.2/3 OR B.2/4 OR B.2/5 OR B.2/6) AND B.3/2 THEN o.501 ELSE x
o.501: It is mandatory to support exactly one of these items

B.5.3 OS1 source optical characteristics, OS1_TT_So

Table B.6: OS1 source optical characteristics

Prerequisite: B.1/2 -- OS1_TT_So present

Item	OS1 source optical characteristics	Reference	Status	Support
1	The mean launched power level at the reference point S - defined as the average optical power of a pseudo-random data sequence coupled into the fibre by the transmitter- at reference point S is between -8 dBm and -15 dBm (OS1-X1.z_TT_So).	G.957 [5] section 6.2.3, table 4 of G.957 [5], ETS 300 232 [4]	c601	
2	The mean launched power level at the reference point S - defined as the average optical power of a pseudo-random data sequence coupled into the fibre by the transmitter- at reference point S is between 0 dBm and -5 dBm (OS1-X1.z_TT_So).	G.957 [5] section 6.2.3, table 4 of G.957 [5], ETS 300 232 [4]	c602	
3	The extinction ratio EX -defined as EX = 10 log10 (A/B), where A is the average optical power level for a logical '1' (emission of light) and B is the average optical power level for a logical '0' (no emission), measured at the reference point S- is not smaller than 8,2 dB (OS1-X1.z_TT_So).	G.957 [5] section 6.2.4, table 4 of G.957 [5], ETS 300 232 [4]	c601	
4	The extinction ratio EX -defined as EX = 10 log10 (A/B), where A is the average optical power level for a logical '1' (emission of light) and B is the average optical power level for a logical '0' (no emission), measured at the reference point S- is not smaller than 10 dB (OS1-X1.z_TT_So).	G.957 [5] section 6.2.4, table 4 of G.957 [5], ETS 300 232 [4]	c602	
5	The pulse shape characteristics -including rise time, fall time, pulse overshoot, pulse undershoot and ringing- is specified in the form of a mask of the transmitter eye diagram at point S. The pulse shape of the signal -coupled to an optical reference receiver whose nominal transfer function is according with the fourth-order Bessel Thompson response described in appendix I of ITU-T Recommendation G.957 [5]- is within the limits as specified in the mask of figure 2 of ITU-T Recommendation G.957 [5] (OS1_TT_So).	G.957 [5] section 6.2.5 figure 2 of G.957 [5] appendix I of G.957 [5] ETS 300 232 [4]	m	

c601: IF ((B.2/1 AND (B.3/1 OR B.3/3)) OR (B.2/2 AND B.3/3) OR (B.2/3 AND (B.3/2 OR B.3/3)) THEN m ELSE x
c602: IF (B.2/4 AND (B.3/2 OR B.3/3)) OR (B.2/5 AND B.3/2) OR (B.2/6 AND (B.3/2 OR B.3/3)) THEN m ELSE x

B.5.4 OS1 receiver characteristics, OS1_TT_Sk

Table B.7: OS1 receiver characteristics

Prerequisite: B.1/3 -- OS1_TT_Sk present

Item	OS1 receiver characteristics	Reference	Status	Support
1	The receiver sensitivity -defined as the minimum acceptable value of average received power at point R to achieve a BER not worse than 10^{-10} - is better than -23 dBm. This value does not include power level associated with dispersion, jitter, or reflection from the optical path (OS1-I1_TT_Sk).	G.957 [5] section 6.4.1, table 4 of G.957 [5], ETS 300 232 [4]	c701	
2	The receiver sensitivity -defined as the minimum acceptable value of average received power at point R to achieve a BER not worse than 10^{-10} - is better than -28 dBm. This value does not include power level associated with dispersion, jitter, or reflection from the optical path (OS1-S1.z_TT_Sk).	G.957 [5] section 6.4.1, table 4 of G.957 [5], ETS 300 232 [4]	c702	
3	The receiver sensitivity -defined as the minimum acceptable value of average received power at point R to achieve a BER not worse than 10^{-10} - is better than -34 dBm. This value does not include power level associated with dispersion, jitter, or reflection from the optical path (OS1-L1.z_TT_Sk).	G.957 [5] section 6.4.1, table 4 of G.957 [5], ETS 300 232 [4]	c703	
4	The receiver overload -defined as the maximum acceptable value of the received average power at point R to achieve a BER not worse than 10^{-10} - is higher than -8 dBm (OS1-I1_TT_Sk, OS1-S1.z_TT_Sk).	G.957 [5] section 6.4.2, table 4 of G.957 [5], ETS 300 232 [4]	c704	
5	The receiver overload -defined as the maximum acceptable value of the received average power at point R to achieve a BER not worse than 10^{-10} - is higher than -10 dBm (OS1-L1.z_TT_Sk).	G.957 [5] section 6.4.2, table 4 of G.957 [5], ETS 300 232 [4]	c705	
6	The maximum reflectance of the receiver measured at the reference point R is better than -25 dB (OS1-L1.2_TT_Sk).	G.957 [5] section 6.4.3, table 4 of G.957 [5], ETS 300 232 [4]	c706	
7	The receiver tolerates an optical path penalty not exceeding 1 dB to account for total degradation due to reflections, intersymbol interference, mode partition noise, and laser chirp (OS1_TT_Sk).	G.957 [5] section 6.4.4, table 4 of G.957 [5], ETS 300 232 [4]	m	

c701: IF B.2/1 AND (B.3/1 OR B.3/3) THEN o.701 ELSE x
c702: IF (B.2/2 AND B.3/3) OR (B.2/3 AND (B.3/2 OR B.3/3)) THEN o.701 ELSE x
c703: IF (B.2/4 AND (B.3/2 OR B.3/3)) OR (B.2/5 AND B.3/2) OR (B.2/6 AND (B.3/2 OR B.3/3)) THEN o.701 ELSE x
c704: IF (B.2/1 AND (B.3/1 OR B.3/3)) OR (B.2/2 AND B.3/3) OR (B.2/3 AND (B.3/2 OR B.3/3)) THEN o.702 ELSE x
c705: IF (B.2/4 AND (B.3/2 OR B.3/3)) OR (B.2/5 AND B.3/2) OR (B.2/6 AND (B.3/2 OR B.3/3)) THEN o.702 ELSE x
c706: IF B.2/5 AND B.3/2 THEN m ELSE x
o.701: It is mandatory to support at least one of these items
o.702: It is mandatory to support at least one of these items

B.5.5 OS1 regeneration characteristics, OS1/RS1_A_So, OS1/RS1_A_Sk

Table B.8: OS1 regeneration output characteristics

Prerequisite: B.1/2 -- OS1_TT_So present

Item	OS1 regeneration output characteristics	Reference	Status	Support
1	In the absence of input jitter at the synchronization interface, the intrinsic jitter at the STM-16 output interface measured over a 60 second interval does not exceed 0,5 UIpp when measured through a single-pole band pass filter with corner frequencies at 500 Hz and 1,3 MHz.	4.3.1	m	
2	In the absence of input jitter at the synchronization interface, the intrinsic jitter at the STM-16 output interface measured over a 60 second interval does not exceed 0,1 UIpp when measured through a single-pole band pass filter with corner frequencies at 65 kHz and 1,3 MHz.	4.3.1	m	

Table B.9: OS1 regeneration input characteristics

Prerequisite: B.1/5 – OS1/RS1_A_Sk adaptation function present

Item	OS1 regeneration input characteristics	Reference	Status	Support
1	Signal regeneration. The function is able to operate with a maximum BER as specified in ETS 300 417-1-1 [1], subclause 11.3.2.1, when any combination of the following signal conditions exist at its input: - input optical power level within the range specified in ETS 300 232 [4]; - jitter modulation applied to the input signal as specified in ETS 300 417-1-1 [1], subclause 11.3.2; - input bit rate in the range 155 520 kbit/s ± 20 ppm.	4.3.2	m	
2	The jitter tolerated -defined as the peak-to-peak amplitude of a sinusoidal jitter applied to the signal at reference point R that causes a 1 dB optical power penalty at the optical receiver and lets the system operate without errors- is within the limits specified in the mask of figure 2 of ITU-T Recommendation G.825 [12].	4.3.2 G.825 [12] section 4.1 figure 2 of G.825 [12] table 2 of G.825 [12] table 2 of G.958 [13]	m	
3	To ensure adequate immunity against the presence of consecutive identical digits (CID) in the STM-1 signal, the OS1/RS1_A_Sk function complies with the specification in section 7.4 of ITU-T Recommendation G.958 [13].	4.3.2, section 7.4 of G.958 [13]	m	

Table B.10: OS1/RS1 frame alignment characteristics

Prerequisite: B.1/3 -- OS1_TT_Sk present

Item	OS1/RS1 frame alignment characteristics	Reference	Status	Support
1	The frame alignment is found by searching for the A1, A2 bytes contained in the STM-1 signal.	4.3.2	o.1001	
2	The framing pattern searched for is a subset of the A1 and A2 bytes contained on the STM-1 signal.	4.3.2	o.1001	
3	The framing signal is continuously checked with the presumed frame start position for alignment.	4.3.2	m	
4	In the In-Frame (IF) status the maximum Out Of Frame (OOF) detection time is 625 µs for a random unframed signal.	4.3.2	m	
5	The algorithm used to check the alignment is such that in IF state, under normal condition, a 10^{-3} (Poisson type) error ratio will not cause false OOF more than once per 6 minutes (median value).	4.3.2	m	
6	In the OOF state, the maximum frame alignment time is 250 µs for an error-free signal with no emulated frame pattern.	4.3.2	m	
7	The algorithm used to recover from the OOF state is such that the probability for false frame recovery with a random unframed signal is not more than 10^{-5} per 250 µs interval.	4.3.2	m	

o.1001: it is mandatory to support exactly one of these items

B.6 Defect, fault and performance monitoring

Prerequisite: B.1/3 -- OS1_TT_Sk present

B.6.1 Port status management

Table B.11: OS1 port status mode process

Item	OS1 port status mode process	Reference	Status	Support
1	The port status mode supports "not monitored" (NMON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
2	The port status mode supports "monitored" (MON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
3	The port status mode supports "automatic" (AUTO) status.	ETS 300 417-1-1 [1] subclause 8.5	o	
4	The AUTO status is left on clearing of dLOS.	ETS 300 417-1-1 [1] subclause 8.5	c1101	
5	The Port Modestatus is provisionable by the EMF.	4.2.2	m	

c1101: IF B.11/3 THEN m ELSE x

B.6.2 Defect detection and clearance criteria

Table B.12: OS1 Loss Of Signal defect (dLOS)

Item	OS1 Loss Of Signal defect (dLOS)	Reference	Status	Support
1	The optical STM-1 Loss Of Signal defect (dLOS) is detected when the received signal has degenerated to a level where SDH frame alignment would be interrupted, and the cause is evidently a drop of incoming power level below operational level.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	
2	The optical STM-1 dLOS is cleared when the received signal level is greater than or equal to minimum operational level.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	

Table B.13: OS1 Loss Of Frame defect (dLOF)

Item	OS1 Loss Of Frame defect (dLOF)	Reference	Status	Support
1	If the OOF anomaly persists for more than 3 ms, the function will enter the LOF state and a dLOF defect is declared.	4.3.2	m	
2	To provide for the case of intermittent OOFs, the integrating timer is not reset to zero until an In Frame (IF) condition persists continuously for at least 3 ms.	4.3.2	m	
3	Once in a LOF state, this state is exited when the IF state persists continuously for at least 3 ms.	4.3.2	m	

B.6.3 Consequent action activation and clearance criteria

Table B.14: OS1 Trail Signal Fail action (aTSF)

Item	OS1 Trail Signal Fail action (aTSF)	Reference	Status	Support
1	The aTSF signal is activated on detection of a dLOS defect in the trail termination sink function.	ETS 300 417-1-1 [1] subclause 8.2.2.5	m	
2	The aTSF signal is deactivated on clearance of a dLOS defect in the trail termination sink function.	ETS 300 417-1-1 [1] subclause 8.2.2.5	m	

Table B.15: OS1 Server Signal Fail action (aSSF)

Item	OS1 Server Signal Fail action (aSSF)	Reference	Status	Support
1	The aSSF is activated on detection of a dLOF defect.	4.3.2	m	
2	The aSSF is activated on reception of a AI_TSF.	4.3.2	m	
3	The aSSF signal is deactivated when the defect(s) which caused the aSSF generation is(are) no longer active and there are no other defects active.	ETS 300 417-1-1 [1] subclause 4.2.2.4	m	

Table B.16: Alarm Indication Signal action (aAIS)

Item	Alarm Indication Signal action (aAIS)	Reference	Status	Support
1	AIS is applied to the output data within 2 frames (250 µs) after AI_TSF reception.	4.3.2	m	
2	AIS is removed upon termination of the AI_TSF condition within 2 frames (250 µs).	4.3.2	m	
3	AIS is applied to the output data within 2 frames (250 µs) after dLOF detection.	4.3.2	m	
4	AIS is removed upon termination of the dLOF condition within 2 frames (250 µs).	4.3.2	m	

B.6.4 Defect correlation

Table B.17: Defect correlation

Item	Defect correlation	Reference	Status	Support
1	The cLOS is declared when dLOS defect is present and the port is the monitoring state (MON).	4.2.2, ETS 300 417-1-1 [1] subclauses 8.2.1.6, 8.3.1	m	
2	The cLOS is cleared if dLOS defect is absent.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
3	The cLOF is declared if dLOF defect is present and no AI_TSF is received.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
4	The cLOF is cleared if dLOF defect is absent.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
5	All the generated fault cause (cXXX) are reported to the EMF.	ETS 300 417-1-1 [1] subclause 8.1, figure 36	m	

B.6.5 Performance monitoring

Table B.18: pOFS performance parameter

Item	pOFS performance parameter	Reference	Status	Support
1	Any second with at least one OOF event is reported as an Out Of Frame Second to the EMF.	4.3.2	m	

Annex C (normative): ICS proforma for STM-4 optical section layer

C.1 Identification of the implementation

In this ETS, an IUT, and of course the identification of an IUT refer to an OS4 layer instance implemented inside the SUT.

Identification of the IUT and the SUT in which it resides should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the ICS should be named as the contact person.

C.1.1 Date of the statement

.....

C.1.2 IUT identification

IUT name:

.....

.....

IUT version

Hardware version:

.....

Software version:

.....

Firmware version:

.....

C.1.3 SUT identification

SUT name:

.....

.....

Hardware configuration:

.....

SUT Software version:

.....

SUT Firmware version:

.....

Operating system:

.....

C.1.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

C.1.5 Client

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

C.1.6 ICS contact person

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

C.2 Identification of the ETS

This ICS proforma applies to the following standard:

ETS 300 417-2-1 [2]: "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment : SDH and PDH physical section layer functions".

C.3 Global statement of conformance of OS4 layer

Are all mandatory capabilities implemented (Yes/No) .....

NOTE: Answering "No" to this question indicates non-conformance to the ETS specification. Non-supported mandatory capabilities are to be identified in the ICS, with an explanation of why the implementation is non-conforming, on pages attached to the ICS proforma.

Answering "Yes" to this question indicates only that all the capabilities with the explicit status "m" are supported. It is not necessary to fill in the support column of the associated item.

C.4 OS4 layer description

Table C.1: OS4 optical section layer function

Item	OS4 optical section layer function	Reference	Status	Support
1	The OS4 Section Layer supports an OS4 Optical Section Connection Function (OS4_C).	5.1	o	
2	The OS4 Section Layer contains an OS4 Trail Termination Source function (OS4_TT_So).	5.2.1	o.101	
3	The OS4 Section Layer contains an OS4 Trail Termination Sink function (OS4_TT_Sk).	5.2.2	o.101	
4	The OS4 Section Layer contains an OS4 Section to RS4 (Regenerator Section) Adaptation Source function (OS4/RS4_A_So).	5.3.1	c101	
5	The OS4 Section Layer contains an OS4 Section to RS4 Adaptation Sink function (OS4/RS4_A_Sk).	5.3.2	c102	

o.101: It is mandatory to support at least one of these items -- at least one TT function present
c101 : IF C.1/2 THEN m ELSE x -- a TT_So function should exist for A_So function
c102 : IF C.1/3 THEN m ELSE x -- a TT_Sk function should exist for A_Sk function

Table C.2: OS4 optical interface classification

Prerequisite: C.1/2 -- OS4_TT_So present

Item	OS4 optical interface classification	Reference	Status	Support
1	The Trail Termination Source support an Intra-office (I4) application (OS4-I4_TT_So).	table 1 of G.957 [5], ETS 300 232 [4]	o.201	
2	The Trail Termination Source support an Inter-office Short-haul with Source nominal wavelength of 1 310 nm (S4.1) application (OS4-S4.1_TT_So).	table 1 of G.957 [5], ETS 300 232 [4]	o.201	
3	The Trail Termination Source support an Inter-office Short-haul with Source nominal wavelength of 1 550 nm (S4.2) application (OS4-S4.2_TT_So).	table 1 of G.957 [5], ETS 300 232 [4]	o.201	
4	The Trail Termination Source support an Inter-office Long-haul with Source nominal wavelength of 1 310 nm (L4.1) application (OS4-L4.1_TT_So).	table 1 of G.957 [5], ETS 300 232 [4]	o.201	
5	The Trail Termination Source support an Inter-office Long-haul with Source nominal wavelength of 1 550 nm on optical fibre complying with ITU-T Recommendations G.652 [18] of G.654 [20] (L4.2) application (OS4-L4.2_TT_So).	table 1 of G.957 [5], ETS 300 232 [4]	o.201	
6	The Trail Termination Source support an Inter-office Long-haul with Source nominal wavelength of 1 550 nm on optical fibre complying with ITU-T Recommendation G.653 [19] (L4.3) application (OS4-L4.3_TT_So).	table 1 of G.957 [5], ETS 300 232 [4]	o.201	

o.201: It is mandatory to support exactly one of these items.

Table C.3: OS4 optical interface source type

Prerequisite: C.1/2 -- OS4_TT_So present

Item	OS4 optical interface source type	Reference	Status	Support
1	The source type is a Light Emitting Diode (LED).	table 4 of G.957 [5], ETS 300 232 [4]	c301	
2	The source type is a Single-Longitudinal Mode laser (SLM).	table 4 of G.957 [5], ETS 300 232 [4]	c302	
3	The source type is a Multi-Longitudinal Mode laser (MLM)	table 4 of G.957 [5], ETS 300 232 [4]	c303	

c301: IF C.2/1 THEN o.301 ELSE x
c302: IF C.2/3 OR C.2/4 OR C.2/5 OR C.2/6 THEN o.301 ELSE x
c303: IF C.2/1 OR C.2/2 OR C.2/3 OR C.2/4 OR C.2/6 THEN o.301 ELSE x
o.301: It is mandatory to support exactly one of these items

C.5 OS4 layer transmission tables

C.5.1 OS4 source operating wavelength range, OS4_TT_So

Table C.4: OS4 source operating wavelength range

Prerequisite: C.1/2 -- OS4_TT_So present

Item	OS4 source operating wavelength range	Reference	Status	Support
1	The source wavelength range is within 1 260 and 1 360 nm (OS4-I4_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c401	
2	The source wavelength range is within 1 293 and 1 334 nm (OS4-S4.1_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c402	
3	The source wavelength range is within 1 274 and 1 356 nm (OS4-S4.1_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c403	
4	The source wavelength range is within 1 430 and 1 580 nm (OS4-S4.2_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c404	
5	The source wavelength range is within 1 300 and 1 325 nm (OS4-L4.1_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c405	
6	The source wavelength range is within 1 280 and 1 335 nm (OS4-L4.1_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c406	
7	The source wavelength range is within 1 480 and 1 580 nm (OS4-L4.2_TT_So, OS4-L4.3_TT_So).	table 4 of G.957 [5], ETS 300 232 [4]	c407	

c401: IF C.2/1 AND (C.3/1 OR C.3/3) THEN o.4 ELSE x
c402: IF C.2/2 AND C.3/3 THEN o.401 ELSE x
c403: IF C.2/2 AND C.3/3 THEN o.401 ELSE x
c404: IF C.2/3 AND C.3/2 THEN o.401 ELSE x
c405: IF C.2/4 AND C.3/3 THEN o.401 ELSE x
c406: IF C.2/4 AND C.3/2 THEN o.401 ELSE x
c407: IF (C.2/5 OR C.2/6) AND C.3/2 THEN o.4 ELSE x
o.401: It is mandatory to support exactly one of these items

C.5.2 OS4 source spectral characteristics, OS4_TT_So

Table C.5: OS4 source spectral characteristics

Prerequisite: C.1/2 -- OS4_TT_So present

Item	OS4 source spectral characteristics	Reference	Status	Support
1	The maximum RMS width under standard operating conditions -measured as the standard deviation of the spectral distribution taking into account all modes that are not more than 20 dB down from the peak mode- is 14,5 nm (OS4-I4_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c501	
2	The maximum RMS width under standard operating conditions -measured as the standard deviation of the spectral distribution taking into account all modes that are not more than 20 dB down from the peak mode- is 35 nm (OS4-I4_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c502	
3	The maximum RMS width under standard operating conditions -measured as the standard deviation of the spectral distribution taking into account all modes that are not more than 20 dB down from the peak mode- is 4 nm (OS4-S4.1_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c503	
4	The maximum RMS width under standard operating conditions -measured as the standard deviation of the spectral distribution taking into account all modes that are not more than 20 dB down from the peak mode- is 2,5 nm (OS4-S4.1_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c504	
5	The maximum RMS width under standard operating conditions -measured as the standard deviation of the spectral distribution taking into account all modes that are not more than 20 dB down from the peak mode- is 2 nm (OS4-L4.1_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c505	
6	The maximum RMS width under standard operating conditions -measured as the standard deviation of the spectral distribution taking into account all modes that are not more than 20 dB down from the peak mode- is 1,7 nm (OS4-L4.1_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c506	
7	The full width of the central wavelength peak, measured under standard operating conditions 20 dB down from the maximum amplitude of the central wavelength, is not more than 1 nm (OS4-L4.z_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c507	
8	The side mode suppression ratio -defined as the relative amplitude of the lateral peaks to the central wavelength peak- is at least 30 dB (OS4-S4.2_TT_So, OS4-L4.z_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5], ETS 300 232 [4]	c508	

c501: IF C.2/1 AND C.3/3 THEN o.501 ELSE x
c502: IF C.2/1 AND C.3/1 THEN o.501 ELSE x
c503: IF C.2/2 AND C.3/3 AND C.4/2 THEN o.501 ELSE x
c504: IF C.2/2 AND C.3/3 AND C.4/3 THEN o.501 ELSE x
c505: IF C.2/4 AND C.3/3 AND C.4/5 THEN o.501 ELSE x
c506: IF C.2/4 AND C.3/3 AND C.4/6 THEN o.501 ELSE x
c507: IF (C.2/4 OR C.2/5 OR C.2/6) AND C.3/2 THEN o.501 ELSE x
c508: IF (C.2/3 OR C.2/4 OR C.2/5 OR C.2/6) AND C.3/2 THEN o.501 ELSE x
o.501: It is mandatory to support exactly one of these items

C.5.3 OS4 source optical characteristics, OS4_TT_So

Table C.6: OS4 source optical characteristics

Prerequisite: C.1/2 -- OS4_TT_So present

Item	OS4 source optical characteristics	Reference	Status	Support
1	The mean launched power level at the reference point S -defined as the average optical power of a pseudo-random data sequence coupled into the fibre by the transmitter- at reference point S is between -8 and -15 dBm (OS4-I4_TT_So, OS4-S4.z_TT_So).	G.957 [5] section 6.2.3, table 4 of G.957 [5], ETS 300 232 [4]	c601	
2	The mean launched power level at the reference point S -defined as the average optical power of a pseudo-random data sequence coupled into the fibre by the transmitter- at reference point S is between +2 and -3 dBm (OS4-L4.z_TT_So).	G.957 [5] section 6.2.3, table 4 of G.957 [5], ETS 300 232 [4]	c602	
3	The extinction ratio EX -defined as EX = 10 log10 (A/B), where A is the average optical power level for a logical '1' (emission of light) and B is the average optical power level for a logical '0' (no emission), measured at the reference point S- is not smaller than 8,2 dB (OS4-I4_TT_So, OS4-S4.z_TT_So).	G.957 [5] section 6.2.4, table 4 of G.957 [5], ETS 300 232 [4]	c601	
4	The extinction ratio EX -defined as EX = 10 log10 (A/B), where A is the average optical power level for a logical '1' (emission of light) and B is the average optical power level for a logical '0' (no emission), measured at the reference point S- is not smaller than 10 dB (OS4-L4.z_TT_So).	G.957 [5] section 6.2.4, table 4 of G.957 [5], ETS 300 232 [4]	c602	
5	The pulse shape characteristics -including rise time, fall time, pulse overshoot, pulse undershoot and ringing- is specified in the form of a mask of the transmitter eye diagram at point S. The pulse shape of the signal -coupled to an optical reference receiver whose nominal transfer function is according with the fourth-order Bessel Thompson response described in appendix I of ITU-T Recommendation G.957 [5]- is within the limits as specified in the mask of figure 2 of ITU-T Recommendation G.957 [5] (OS4 _TT_So).	G.957 [5] section 6.2.5 figure 2 of G.957 [5] appendix I of G.957 [5] ETS 300 232 [4]	m	

c601: IF ((C.2/1 AND (C.3/1 OR C.3/3)) OR (C.2/2 AND C.3/3) OR (C.2/3 AND C.3/2) THEN m ELSE x
c602: IF (C.2/4 AND (C.3/2 OR C.3/3)) OR ((C.2/5 OR C.2/6) AND C.3/2) THEN m ELSE x

C.5.4 OS4 receiver characteristics, OS4_TT_Sk

Table C.7: OS4 receiver characteristics

Prerequisite: C.1/3 -- OS4_TT_Sk present

Item	OS4 receiver characteristics	Reference	Status	Support
1	The receiver sensitivity -defined as the minimum acceptable value of average received power at point R to achieve a BER not worse than 10^{-10} - is better than -23 dBm. This value does not include power level associated with dispersion, jitter, or reflection from the optical path (OS4-I4_TT_Sk).	G.957 [5] section 6.4.1, table 4 of G.957 [5], ETS 300 232 [4]	c701	
2	The receiver sensitivity -defined as the minimum acceptable value of average received power at point R to achieve a BER not worse than 10^{-10} - is better than -28 dBm. This value does not include power level associated with dispersion, jitter, or reflection from the optical path (OS4-S4.z_TT_Sk, OS4-L4.z_TT_Sk).	G.957 [5] section 6.4.1, table 4 of G.957 [5], ETS 300 232 [4]	c702	
3	The receiver overload -defined as the maximum acceptable value of the received average power at point R to achieve a BER not worse than 10^{-10} - is higher than -8 dBm (OS4_TT_Sk).	G.957 [5] section 6.4.2, table 4 of G.957 [5], ETS 300 232 [4]	m	
4	The maximum reflectance of the receiver measured at the reference point R is better than [tbd] (OS4-I4_TT_Sk, OS4-S4.1_TT_Sk).	G.957 [5] section 6.4.3, table 4 of G.957 [5], ETS 300 232 [4]	c703	
5	The maximum reflectance of the receiver measured at the reference point R is better than -27 dB (OS4-S4.2_TT_Sk, OS4-L4.2_TT_Sk).	G.957 [5] section 6.4.3, table 4 of G.957 [5], ETS 300 232 [4]	c704	
6	The maximum reflectance of the receiver measured at the reference point R is better than -14 dB (OS4-L4.1_TT_Sk, OS4-L4.3_TT_Sk).	G.957 [5] section 6.4.3, table 4 of G.957 [5], ETS 300 232 [4]	c705	
7	The receiver tolerates an optical path penalty not exceeding 1 dB to account for total degradation due to reflections, intersymbol interference, mode partition noise, and laser chirp (OS4_TT_Sk).	G.957 [5] section 6.4.4, table 4 of G.957 [5], ETS 300 232 [4]	m	

c701: IF C.2/1 AND (C.3/1 OR C.3/3) THEN o.701 ELSE x
c702: IF (C.2/2 AND C.3/3) OR (C.2/3 AND C.3/2) or (C.2/4 AND (C.3/2 OR C.3/3)) OR ((C.2/5 OR C.2/6) AND C.3/2) THEN o.701 ELSE x
c703: IF (C.2/1 AND (C.3/1 OR C.3/3)) OR (C.2/2 AND C.3/3) THEN o.702 ELSE x
c704: IF (C.2/3 AND C.3/2) OR (C.2/5 AND C.3/3) THEN o.702 ELSE x
c705: IF (C.2/4 AND (C.3/2 OR C.3/3)) OR (C.2/6 AND C.3/2) THEN o.702 ELSE x
o.701: It is mandatory to support at least one of these items
o.702: It is mandatory to support at least one of these items

C.5.5 OS4 regeneration characteristics, OS4/RS4_A_So, OS4/RS4_A_Sk

Table C.8: OS4 regeneration output characteristics

Prerequisite: C.1/2 -- OS4_TT_So present

Item	OS4 regeneration output characteristics	Reference	Status	Support
1	In the absence of input jitter at the synchronization interface, the intrinsic jitter at the STM-16 output interface measured over a 60 second interval does not exceed 0,5 UIpp when measured through a single-pole band pass filter with corner frequencies at 1 000 Hz and 5 MHz.	5.3.1	m	
2	In the absence of input jitter at the synchronization interface, the intrinsic jitter at the STM-16 output interface measured over a 60 second interval does not exceed 0,1 UIpp when measured through a single-pole band pass filter with corner frequencies at 250 kHz and 5 MHz.	5.3.1	m	

Table C.9: OS4 regeneration input characteristics

Prerequisite: C.1/5 – OS4/RS4_A_Sk adaptation function present

Item	OS4 regeneration input characteristics	Reference	Status	Support
1	Signal regeneration. The function is able to operate with a maximum BER as specified in ETS 300 417-1-1 [1], subclause 11.3.2.1, when any combination of the following signal conditions exist at its input: - input optical power level within the range specified in ETS 300 232 [4]; - jitter modulation applied to the input signal as specified in ETS 300 417-1-1 [1], subclause 11.3.2; - input bit rate in the range 622 080 kbit/s ± 20 ppm.	5.3.2	m	
2	The jitter tolerated -defined as the peak-to-peak amplitude of a sinusoidal jitter applied to the signal at reference point R that causes a 1 dB optical power penalty at the optical receiver and lets the system operate without errors- is within the limits specified in the mask of figure 2 of ITU-T Recommendation G.825 [12].	5.3.2 G.825 [12] section 4.1figure 2 of G.825 [12] table 2 of G.825 [12] table 2 of G.958 [13]	m	
3	To ensure adequate immunity against the presence of consecutive identical digits (CID) in the STM-4 signal, the OS4/RS4_A_Sk function complies with the specification in section 7.4 of ITU-T Recommendation G.958 [13].	5.3.2, section 7.4 of G.958 [13]	m	

Table C.10: OS4/RS4 frame alignment characteristics

Prerequisite: C.1/3 -- OS4_TT_Sk present

Item	OS4/RS4 frame alignment characteristics	Reference	Status	Support
1	The frame alignment is found by searching for the A1, A2 bytes contained in the STM-4 signal.	5.3.2	o.1001	
2	The framing pattern searched for is a subset of the A1 and A2 bytes contained on the STM-4 signal.	5.3.2	o.1001	
3	The framing signal is continuously checked with the presumed frame start position for alignment.	5.3.2	m	
4	In the In-Frame (IF) status the maximum OOF detection time is 625 µs for a random unframed signal.	5.3.2	m	
5	The algorithm used to check the alignment is such that in IF state, under normal condition, a 10^{-3} (Poisson type) error ratio will not cause false OOF more than once per 6 minutes (median value).	5.3.2	m	
6	In the OOF state, the maximum frame alignment time is 250 µs for an error-free signal with no emulated frame pattern.	5.3.2	m	
7	The algorithm used to recover from the OOF state is such that the probability for false frame recovery with a random unframed signal is not more than 10^{-5} per 250 µs interval.	5.3.2	m	

o.1001: it is mandatory to support exactly one of these items

C.6 OS4 layer defect, fault and performance monitoring tables

Prerequisite: C.1/3 -- OS4_TT_Sk present

C.6.1 Port status management

Table C.11: OS4 port status mode process

Item	OS4 port status mode process	Reference	Status	Support
1	The port status mode supports "not monitored" (NMON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
2	The port status mode supports "monitored" (MON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
3	The port status mode supports "automatic" (AUTO) status.	ETS 300 417-1-1 [1] subclause 8.5	o	
4	The AUTO status is left on clearing of dLOS.	ETS 300 417-1-1 [1] subclause 8.5	c1101	
5	The Port Modestatus is provisionable by the EMF.	5.2.2	m	

c1101: IF C.11/3 THEN m ELSE x

C.6.2 Defect detection and clearance criteria

Table C.12: OS4 Loss Of Signal defect (dLOS)

Item	OS4 Loss Of Signal defect (dLOS)	Reference	Status	Support
1	The optical STM-4 dLOS is detected when the received signal has degenerated to a level where SDH frame alignment would be interrupted, and the cause is evidently a drop of incoming power level below operational level.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	
2	The optical STM-4 dLOS is cleared when the received signal level is greater than or equal to the minimum operational level.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	

Table C.13: OS4 Loss Of Frame defect (dLOF)

Item	OS4 Loss Of Frame defect (dLOF)	Reference	Status	Support
1	If the OOF anomaly persists for more than 3 ms, the function will enter the LOF state and a dLOF defect is declared.	5.3.2	m	
2	To provide for the case of intermittent OOFs, the integrating timer is not reset to zero until an In Frame (IF) condition persists continuously for at least 3 ms.	5.3.2	m	
3	Once in a LOF state, this state is exited when the IF state persists continuously for at least 3 ms.	5.3.2	m	

C.6.3 Consequent action activation and clearance criteria

Table C.14: OS4 Trail Signal Fail action (aTSF)

Item	OS4 Trail Signal Fail action (aTSF)	Reference	Status	Support
1	The aTSF signal is activated on detection of a dLOS defect in the trail termination sink function.	ETS 300 417-1-1 [1] subclause 8.2.2.5	m	
2	The aTSF signal is deactivated on clearance of a dLOS defect in the trail termination sink function.	ETS 300 417-1-1 [1] subclause 8.2.2.5	m	

Table C.15: OS4 Server Signal Fail action (aSSF)

Item	OS4 Server Signal Fail action (aSSF)	Reference	Status	Support
1	The aSSF is activated on detection of a dLOF defect.	5.3.2	m	
2	The aSSF is activated on detection of a AI_TSF.	5.3.2	m	
3	The aSSF signal is deactivated when the defect(s) which caused the aSSF generation is(are) no longer active and there are no other defects active.	ETS 300 417-1-1 [1] subclause 8.2.2.4	m	

Table C.16: Alarm Indication Signal action (aAIS)

Item	Alarm Indication Signal action (aAIS)	Reference	Status	Support
1	AIS is applied to the output data within 2 frames (250 µs) after AI_TSF reception.	5.3.2	m	
2	AIS is removed upon termination of the AI_TSF condition within 2 frames (250 µs).	5.3.2	m	
3	AIS is applied to the output data within 2 frames (250 µs) after dLOF detection.	5.3.2	m	
4	AIS is removed upon termination of the dLOF condition within 2 frames (250 µs).	5.3.2	m	

C.6.4 Defect correlation

Table C.17: Defect correlation

Item	Defect correlation	Reference	Status	Support
1	The cLOS is declared when dLOS defect is present and the port is the monitoring state (MON).	ETS 300 417-1-1 [1] subclauses 8.2.1.6, 8.3.1, 4.2.2	m	
2	The cLOS is cleared if dLOS defect is absent.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
3	The cLOF is declared if dLOF defect is present and no AI_TSF is received.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
4	The cLOF is cleared if dLOF defect is absent.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
5	All the generated fault cause (cXXX) are reported to the EMF.	ETS 300 417-1-1 [1] subclause 8.1, figure 36	m	

C.6.5 Performance monitoring

Table C.18: pOFS performance parameter

Item	pOFS performance parameter	Reference	Status	Support
1	Any second with at least one OOF event is reported as an Out Of Frame Second to the EMF.	5.3.2	m	

Annex D (normative): ICS proforma for STM-16 optical section layer

D.1 Identification of the implementation

In this ETS, an IUT, and of course the identification of an IUT refer to an OS16 layer instance implemented inside the SUT.

Identification of the IUT and the SUT in which it resides should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the ICS should be named as the contact person.

D.1.1 Date of the statement

.....

D.1.2 IUT identification

IUT name:

.....

.....

IUT version

Hardware version:

.....

Software version:

.....

Firmware version:

.....

D.1.3 SUT identification

SUT name:

.....

.....

Hardware configuration:

.....

SUT Software version:

.....

SUT Firmware version:

.....

Operating system:

.....

D.1.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

D.1.5 Client

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

D.1.6 ICS contact person

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

D.2 Identification of the ETS

This ICS proforma applies to the following standard:

ETS 300 417-2-1 [2]: "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment : SDH and PDH physical section layer functions".

D.3 Global statement of conformance of OS16 layer

Are all mandatory capabilities implemented (Yes/No) .....

NOTE: Answering "No" to this question indicates non-conformance to the ETS specification. Non-supported mandatory capabilities are to be identified in the ICS, with an explanation of why the implementation is non-conforming, on pages attached to the ICS proforma.

Answering "Yes" to this question indicates only that all the capabilities with the explicit status "m" are supported. It is not necessary to fill in the support column of the associated item.

D.4 OS16 layer description

Table D.1: OS16 optical section layer function

Item	OS16 optical section layer function	Reference	Status	Support
1	The OS16 Section Layer supports an OS16 Optical Section Connection Function (OS16_C).	6.1	o	
2	The OS16 Section Layer contains an OS16 Trail Termination Source function (OS16_TT_So).	6.2.1	o.101	
3	The OS16 Section Layer contains an OS16 Trail Termination Sink function (OS16_TT_Sk).	6.2.2	o.101	
4	The OS16 Section Layer contains an OS16 Section to RS16 (Regenerator Section) Adaptation Source function (OS16/RS16_A_So).	6.3.1	c101	
5	The OS16 Section Layer contains an OS16 Section to RS16 Adaptation Sink function (OS16/RS16_A_Sk).	6.3.2	c102	

o.101: It is mandatory to support at least one of these items -- at least one TT function present
c101 : IF D.1/2 THEN m ELSE x -- a TT_So function should exist for A_So function
c102 : IF D.1/3 THEN m ELSE x -- a TT_Sk function should exist for A_Sk function

Table D.2: OS16 optical interface classification

Prerequisite: D.1/2 -- OS16_TT_So present

Item	OS16 optical interface classification	Reference	Status	Support
1	The Trail Termination Source supports an Intra-office (I16) application (OS16-I16_TT_So).	table 1 of G.957 [5] ETS 300 232 [4]	o.201	
2	The Trail Termination Source supports an Inter-office Short-haul with Source nominal wavelength of 1 310 nm (S16.1) application (OS16-S16.1_TT_So).	table 1 of G.957 [5] ETS 300 232 [4]	o.201	
3	The Trail Termination Source supports an Inter-office Short-haul with Source nominal wavelength of 1 550 nm (S16.2) application (OS16-S16.2_TT_So).	table 1 of G.957 [5] ETS 300 232 [4]	o.201	
4	The Trail Termination Source supports an Inter-office Long-haul with Source nominal wavelength of 1 310 nm (L16.1) application (OS16-L16.1_TT_So).	table 1 of G.957 [5] ETS 300 232 [4]	o.201	
5	The Trail Termination Source supports an Inter-office Long-haul with Source nominal wavelength of 1 550 nm on optical fibre complying with ITU-T Recommendations G.652 [18]/G.654 [20] (L16.2) application (OS16-L16.2_TT_So).	table 1 of G.957 [5] ETS 300 232 [4]	o.201	
6	The Trail Termination Source supports an Inter-office Long-haul with Source nominal wavelength of 1 550 nm on optical fibre complying with ITU-T Recommendation G.653 [19] (L16.3) application (OS16-L16.3_TT_So).	table 1 of G.957 [5] ETS 300 232 [4]	o.201	

o.201: It is mandatory to support exactly one of these items

Table D.3: OS16 optical interface source type

Prerequisite: D.1/2 -- OS16_TT_So present

Item	OS16 optical interface source type	Reference	Status	Support
1	The source type is a Single-Longitudinal Mode laser (SLM).	table 4 of G.957 [5] ETS 300 232 [4]	o.301	
2	The source type is a Multi-Longitudinal Mode laser (MLM).	table 4 of G.957 [5] ETS 300 232 [4]	o.301	

o.301: It is mandatory to support exactly one of these items

D.5 OS16 layer transmission tables

D.5.1 OS16 source operating wavelength range, OS16_TT_So

Table D.4: OS16 source operating wavelength range

Prerequisite: D.1/2 -- OS16_TT_So present

Item	OS16 source operating wavelength range	Reference	Status	Support
1	The source wavelength range is within 1 266 and 1 360 nm (OS16-I16_TT_So).	table 4 of G.957 [5] ETS 300 232 [4]	c401	
2	The source wavelength range is within 1 260 and 1 360 nm (OS16-S16.1_TT_So).	table 4 of G.957 [5] ETS 300 232 [4]	c402	
3	The source wavelength range is within 1 430 and 1 580 nm (OS16-S16.2_TT_So).	table 4 of G.957 [5] ETS 300 232 [4]	c403	
4	The source wavelength range is within 1 280 and 1 335 nm (OS16-L16.1_TT_So).	table 4 of G.957 [5] ETS 300 232 [4]	c404	
5	The source wavelength range is within 1 500 and 1 580 nm (OS16-L16.2_TT_So, OS16-L16.3_TT_So).	table 4 of G.957 [5] ETS 300 232 [4]	c405	

c401: IF D.2/1 AND D.3/2 THEN o.401 ELSE x
c402: IF D.2/2 AND D.3/1 THEN o.401 ELSE x
c403: IF D.2/3 AND D.3/1 THEN o.401 ELSE x
c404: IF D.2/4 AND D.3/1 THEN o.401 ELSE x
c405: IF (D.2/5 OR D.2/6) AND D.3/1 THEN o.401 ELSE x
o.401: It is mandatory to support exactly one of these items

D.5.2 OS16 source spectral characteristics, OS16_TT_So

Table D.5: OS16 source spectral characteristics

Prerequisite: D.1/2 -- OS16_TT_So present

Item	OS16 source spectral characteristics	Reference	Status	Support
1	The maximum RMS width under standard operating conditions -measured as the standard deviation of the spectral distribution taking into account all modes that are not more than 20 dB down from the peak mode- is 4 nm (OS16-I16_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5] ETS 300 232 [4]	c501	
2	The full width of the central wavelength peak, measured under standard operating conditions 20 dB down from the maximum amplitude of the central wavelength, is not more than 1 nm (OS16-S16.z_TT_So, OS16-L16.z_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5] ETS 300 232 [4]	c502	
3	The side mode suppression ratio -defined as the relative amplitude of the lateral peaks to the central wavelength peak- is at least 30 dB (OS16-L16.2_TT_So, OS16-L16.3_TT_So).	G.957 [5] section 6.2.2, table 4 of G.957 [5] ETS 300 232 [4]	c503	

c501: IF D.2/1 THEN o.501 ELSE x
c502: IF (D.2/2 OR D.2/3 OR D.2/4 OR D.2/5 OR D.2/6) AND D.3/1 THEN o.501 ELSE x
c503: IF (D.2/2 OR D.2/3 OR D.2/4 OR D.2/5 OR D.2/6) AND D.3/1 THEN m ELSE x
o.501: It is mandatory to support exactly one of these items

D.5.3 OS16 source optical characteristics, OS16_TT_So

Table D.6: OS16 source optical characteristics

Prerequisite: D.1/2 -- OS16_TT_So present

Item	OS16 source optical characteristics	Reference	Status	Support
1	The mean launched power level at the reference point S - defined as the average optical power of a pseudo-random data sequence coupled into the fibre by the transmitter- at reference point S is between -3 and -10 dBm (OS16-I16_TT_So).	G.957 [5] section 6.2.3, table 4 of G.957 [5] ETS 300 232 [4]	c601	
2	The mean launched power level at the reference point S - defined as the average optical power of a pseudo-random data sequence coupled into the fibre by the transmitter- at reference point S is between 0 and -5 dBm (OS16-S16.z_TT_So).	G.957 [5] section 6.2.3, table 4 of G.957 [5] ETS 300 232 [4]	c602	
3	The mean launched power level at the reference point S - defined as the average optical power of a pseudo-random data sequence coupled into the fibre by the transmitter- at reference point S is between +3 and -2 dBm (OS16-L16.z_TT_So).	G.957 [5] section 6.2.3, table 4 of G.957 [5] ETS 300 232 [4]	c603	
4	The extinction ratio EX -defined as EX = 10 log10 (A/B), where A is the average optical power level for a logical '1' (emission of light) and B is the average optical power level for a logical '0' (no emission), measured at the reference point S- is not smaller than 8,2 dB (OS16_TT_So).	G.957 [5] section 6.2.4, table 4 of G.957 [5] ETS 300 232 [4]	m	
5	The pulse shape characteristics -including rise time, fall time, pulse overshoot, pulse undershoot and ringing- is specified in the form of a mask of the transmitter eye diagram at point S. The pulse shape of the signal -coupled to an optical reference receiver whose nominal transfer function is according with the fourth-order Bessel Thompson response described in appendix I of ITU-T Recommendation G.957 [5] - is within the limits as specified in the mask of figure 2 of ITU-T Recommendation G.957 [5](OS16_TT_So).	G.957 [5] section 6.2.5 figure 2 of G.957 [5] appendix I of G.957 [5] ETS 300 232 [4]	m	

c601: IF D.2/1 AND D.3/2 THEN o.601 ELSE x
c602: IF (D.2/2 OR D.2/3) AND D.3/1 THEN o.601 ELSE x
c603: IF (D.2/4 OR D.2/5 OR D.2/6) AND D.3/1 THEN o.601 ELSE x
o.601: It is mandatory to support exactly one of these items

D.5.4 OS16 receiver characteristics, OS16_TT_Sk

Table D.7: OS16 receiver characteristics

Prerequisite: D.1/3 -- OS16_TT_Sk present

Item	OS16 receiver characteristics	Reference	Status	Support
1	The receiver sensitivity -defined as the minimum acceptable value of average received power at point R to achieve a BER not worse than 10^{-10} - is better than -18 dBm. This value does not include power level associated with dispersion, jitter, or reflection from the optical path (OS16-I16_TT_Sk, OS16-S16.z_TT_Sk).	G.957 [5] section 6.4.1, table 4 of G.957 [5] ETS 300 232 [4]	c701	
2	The receiver sensitivity -defined as the minimum acceptable value of average received power at point R to achieve a BER not worse than 10^{-10} - is better than -27 dBm. This value does not include power level associated with dispersion, jitter, or reflection from the optical path (OS16-L16.1_TT_Sk, OS16-L16.3_TT_Sk).	G.957 [5] section 6.4.1, table 4 of G.957 [5] ETS 300 232 [4]	c702	
3	The receiver sensitivity -defined as the minimum acceptable value of average received power at point R to achieve a BER not worse than 10^{-10} - is better than -28 dBm. This value does not include power level associated with dispersion, jitter, or reflection from the optical path (OS16-L16.2_TT_Sk).	G.957 [5] section 6.4.1, table 4 of G.957 [5] ETS 300 232 [4]	c703	
4	The receiver overload -defined as the maximum acceptable value of the received average power at point R to achieve a BER not worse than 10^{-10} - is higher than -3 dBm (OS16-I16_TT_Sk).	G.957 [5] section 6.4.2, table 4 of G.957 [5] ETS 300 232 [4]	c704	
5	The receiver overload -defined as the maximum acceptable value of the received average power at point R to achieve a BER not worse than 10^{-10} - is higher than 0 dBm (OS16-S16.z_TT_Sk).	G.957 [5] section 6.4.2, table 4 of G.957 [5] ETS 300 232 [4]	c705	
6	The receiver overload -defined as the maximum acceptable value of the received average power at point R to achieve a BER not worse than 10^{-10} - is higher than -9 dBm (OS16-L16.z_TT_Sk).	G.957 [5] section 6.4.2, table 4 of G.957 [5] ETS 300 232 [4]	c706	
7	The maximum reflectance of the receiver measured at the reference point R is better than -27 dB (OS16_TT_Sk).	G.957 [5] section 6.4.3, table 4 of G.957 [5] ETS 300 232 [4]	m	
8	The receiver tolerates an optical path penalty not exceeding 1 dB to account for total degradation due to reflections, intersymbol interference, mode partition noise, and laser chirp (OS16-L16.z_TT_Sk).	G.957 [5] section 6.4.4, table 4 of G.957 [5] ETS 300 232 [4]	c707	
9	The receiver tolerates an optical path penalty not exceeding 2 dB to account for total degradation due to reflections, intersymbol interference, mode partition noise, and laser chirp (OS16-L16.2_TT_Sk).	G.957 [5] section 6.4.4, table 4 of G.957 [5] ETS 300 232 [4]	c708	

c701: IF D.2/1 OR D.2/2 OR D.2/3) AND D.3/1 THEN o.701 ELSE x
c702: IF (D.2/4 OR D.2/6) AND D.3/1 THEN o.701 ELSE x
c703: IF D.2/5 AND D.3/1 THEN o.701 ELSE x
c704: IF D.2/1 AND D.3/1 THEN o.702 ELSE x
c705: IF (D.2/2 OR D.2/3) AND D.3/1 THEN o.702 ELSE x
c706: IF (D.2/4 AND D.2/5 OR D.2/6) AND D.3/1 THEN o.702 ELSE x
c707: IF NOT D.2/5 THEN o.703 ELSE x
c708: IF D.2/5 AND D.3/1 THEN o.703 ELSE x
o.701: It is mandatory to support at least one of these items
o.702: It is mandatory to support at least one of these items
o.703: It is mandatory to support at least one of these items

D.5.5 OS16 regeneration characteristics, OS16/RS16_A_So, OS16/RS16_A_Sk

Table D.8: OS16 regeneration output characteristics

Prerequisite: D.1/2 -- OS16_TT_So present

Item	OS16 regeneration output characteristics	Reference	Status	Support
1	In the absence of input jitter at the synchronization interface, the intrinsic jitter at the STM-16 output interface measured over a 60 second interval does not exceed 0,5 UIpp when measured through a single-pole band pass filter with corner frequencies at 5 kHz and 20 MHz.	6.3.1	m	
2	In the absence of input jitter at the synchronization interface, the intrinsic jitter at the STM-16 output interface measured over a 60 second interval does not exceed 0,1 UIpp when measured through a single-pole band pass filter with corner frequencies at 1 MHz and 20 MHz.	6.3.1	m	

Table D.9: OS16 regeneration input characteristics

Prerequisite: D.1/5 – OS16/RS16_A_Sk adaptation function present

Item	OS16 regeneration input characteristics	Reference	Status	Support
1	Signal regeneration. The function is able to operate with a maximum BER as specified in ETS 300 417-1-1 [1], subclause 11.3.2.1, when any combination of the following signal conditions exist at its input: - input optical power level within the range specified in ETS 300 232 [4]; - jitter modulation applied to the input signal as specified in ETS 300 417-1-1 [1], subclause 11.3.2; - input bit rate in the range 2 488 320 kbit/s ± 20 ppm.	6.3.2	m	
2	The jitter tolerated -defined as the peak-to-peak amplitude of a sinusoidal jitter applied to the signal at reference point R that causes a 1 dB optical power penalty at the optical receiver and lets the system operate without errors- is within the limits specified in the mask of figure 2 of ITU-T Recommendation G.825 [12].	6.3.2 G.825 [12] section 4.1, figure 2 of G.825 [12]' table 2 of G.825 [12], table 2 of G.958 [13]	m	
3	To ensure adequate immunity against the presence of consecutive identical digits (CID) in the STM-16 signal, the OS16/RS16_A_Sk function complies with the specification in section 7.4 of ITU-T Recommendation G.958 [13].	6.3.2, section 7.4 of G.958 [13]	m	

Table D.10: OS16/RS16 frame alignment characteristics

Prerequisite: D.1/3 -- OS16_TT_Sk present

Item	OS16/RS16 frame alignment characteristics	Reference	Status	Support
1	The frame alignment is found by searching for the A1, A2 bytes contained in the STM-16 signal.	6.3.2	o.1001	
2	The framing pattern searched for is a subset of the A1 and A2 bytes contained on the STM-16 signal.	6.3.2	o.1001	
3	The framing signal is continuously checked with the presumed frame start position for alignment.	6.3.2	m	
4	In the In-Frame (IF) status the maximum OOF detection time is 625 µs for a random unframed signal.	6.3.2	m	
5	The algorithm used to check the alignment is such that in IF state, under normal condition, a 10^{-3} (Poisson type) error ratio will not cause false OOF more than once per 6 minutes (median value).	6.3.2	m	
6	In the OOF state, the maximum frame alignment time is 250 µs for an error-free signal with no emulated frame pattern.	6.3.2	m	
7	The algorithm used to recover from the OOF state is such that the probability for false frame recovery with a random unframed signal is not more than 10^{-5} per 250 µs interval.	6.3.2	m	

o.1001: it is mandatory to support exactly one of these items

D.6 OS16 layer defect, fault and performance monitoring tables

Prerequisite: D.1/3 -- OS16_TT_Sk present

D.6.1 Port status management

Table D.11: OS16 port status mode process

Item	OS16 port status mode process	Reference	Status	Support
1	The port status mode supports "not monitored" (NMON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
2	The port status mode supports "monitored" (MON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
3	The port status mode supports "automatic" (AUTO) status.	ETS 300 417-1-1 [1] subclause 8.5	o	
4	The AUTO status is left on clearing of dLOS.	ETS 300 417-1-1 [1] subclause 8.5	c1101	
5	The port mode status is provisionable by the EMF.	6.2.2	m	

c1101: IF D.11/3 THEN m ELSE x

D.6.2 Defect detection and clearance criteria

Table D.12: OS16 Loss Of Signal defect (dLOS)

Item	OS16 Loss Of Signal defect (dLOS)	Reference	Status	Support
1	The optical STM-16 dLOS is detected when the received signal has degenerated to a level where SDH frame alignment would be interrupted, and the cause is evidently a drop of incoming power level below operational level.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	
2	The optical STM-16 dLOS is cleared when the received signal level is greater than or equal to the minimum operational level.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	

Table D.13: OS16 Loss Of Frame defect (dLOF)

Item	OS16 Loss Of Frame defect (dLOF)	Reference	Status	Support
1	If the OOF anomaly persists for more than 3 ms, the function will enter the LOF state and a dLOF defect is declared.	6.3.2	m	
2	To provide for the case of intermittent OOFs, the integrating timer is not reset to zero until an In Frame (IF) condition persists continuously for at least 3 ms.	6.3.2	m	
3	Once in a LOF state, this state is exited when the IF state persists continuously for at least 3 ms.	6.3.2	m	

D.6.3 Consequent action activation and clearance criteria

Table D.14: OS16 Trail Signal Fail action (aTSF)

Item	OS16 Trail Signal Fail action (aTSF)	Reference	Status	Support
1	The aTSF signal is activated on detection of a dLOS defect in the trail termination sink function.	ETS 300 417-1-1 [1] subclause 8.2.2.5	m	
2	The aTSF signal is deactivated on clearance of a dLOS defect in the trail termination sink function.	ETS 300 417-1-1 [1] subclause 8.2.2.5	m	

Table D.15: OS16 Server Signal Fail action (aSSF)

Item	OS16 Server Signal Fail action (aSSF)	Reference	Status	Support
1	The aSSF is activated on detection of a dLOF defect.	6.3.2	m	
2	The aSSF is activated on reception of a AI_TSF.	6.3.2	m	
3	The aSSF signal is deactivated when the defect(s) which caused the aSSF generation is(are) no longer active and there are no other defects active.	ETS 300 417-1-1 [1] subclause 8.2.2.4	m	

Table D.16: Alarm Indication Signal action (aAIS)

Item	Alarm Indication Signal action (aAIS)	Reference	Status	Support
1	AIS is applied to the output data within 2 frames (250 µs) after AI_TSF reception.	6.3.2	m	
2	AIS is removed upon termination of the AI_TSF condition within 2 frames (250 µs).	6.3.2	m	
3	AIS is applied to the output data within 2 frames (250 µs) after dLOF detection.	6.3.2	m	
4	AIS is removed upon termination of the dLOF condition within 2 frames (250 µs).	6.3.2	m	

D.6.4 Defect correlation

Table D.17: Defect correlation

Item	Defect correlation	Reference	Status	Support
1	The cLOS is declared when dLOS defect is present and the port is the monitoring state (MON).	6.2.2, ETS 300 417-1-1 [1] subclauses 8.2.1.6, 8.3.1	m	
2	The cLOS is cleared if dLOS defect is absent.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
3	The cLOF is declared if dLOF defect is present and no AI_TSF is received.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
4	The cLOF is cleared if dLOF defect is absent.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
5	All the generated fault cause (cXXX) are reported to the EMF.	ETS 300 417-1-1 [1] subclause 8.1, figure 36	m	

D.6.5 Performance monitoring

Table D.18: pOFS performance parameter

Item	pOFS performance parameter	Reference	Status	Support
1	Any second with at least one OOF event is reported as an Out Of Frame Second to the EMF.	6.3.2	m	

Annex E (normative): ICS proforma for STM-1 electrical section layer

E.1 Identification of the implementation

In this ETS, an IUT, and of course the identification of an IUT refers to an ES1 layer instance implemented inside the SUT.

Identification of the IUT and the SUT should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the ICS should be named as the contact person.

E.1.1 Date of the statement

.....

E.1.2 IUT identification

IUT name:

.....

.....

IUT version

Hardware version:

.....

Software version:

.....

Firmware version:

.....

E.1.3 SUT identification

SUT name:

.....

.....

Hardware configuration:

.....

SUT Software version:

.....

SUT Firmware version:

.....

Operating system:

.....

E.1.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

E.1.5 Client

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

E.1.6 ICS contact person

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

E.2 Identification of the ETS

This ICS proforma applies to the following standard:

ETS 300 417-2-1 [2]: "Transmission and Multiplexing (TM); Generic functional requirements for SDH equipment: Physical section layer functions".

E.3 Global statement of conformance of ES1 layer

Are all mandatory capabilities implemented? (Yes/No) .....

NOTE: Answering "No" to this question indicates non-conformance to the ETS specification. Non-supported mandatory capabilities are to be identified in the ICS, with an explanation of why the implementation is non-conforming, on pages attached to the ICS proforma.

Answering "Yes" to this question indicates only that all the capabilities with the explicit status "m" are supported. It is not necessary to fill in the support column of the associated item.

E.4 ES1 layer description

Table E.1: ES1 electrical section layer function

Item	STM-1 electrical section layer function	Reference	Status	Support
1	The STM-1 electrical section layer supports Electrical Section Connection function.	8.1	o	
2	The STM-1 electrical section layer contains an ES1 Trail Termination Source function (ES1_TT_So).	8.2.1	m	
3	The STM-1 electrical section layer contains an ES1 Trail Termination Sink function (ES1_TT_Sk).	8.2.2	m	
4	The ES1 Section Layer contains an ES1 Section to RS1 Adaptation Source function (ES1/RS1_A_So).	8.3.1	m	
5	The ES1 Section Layer contains an ES1 Section to RS1 Adaptation Sink function (ES1/RS1_A_Sk).	8.3.2	m	

E.5 ES1 layer transmission tables

E.5.1 ES1 layer data stream

Table E.2: STM-1 signal

Item	STM-1 signal	Reference	Status	Support
1	The ES1_CI of the intra-station layer CP is an electrical, digital signal of defined amplitude and pulse shape.	8	m	

E.5.2 ES1 layer connection function, ES1_C

Table E.3: ES1 connection functionalities

Item	ES1 connection functionalities	Reference	Status	Support
1	no requirement	8.1	n/a	

E.5.3 ES1 layer trail termination functions, ES1_TT_So and ES1_TT_Sk

Table E.4: Electrical characteristics

Item	Electrical characteristics	Reference	Status	Support
1	The pulse shape characteristics - including peak-to-peak voltage, pulse width, "steady state" amplitude, pulse overshoot, rise time, decay time - is specified in the form of a mask. The pulse shape corresponding to a binary 0 is compliant to the mask in figure 24 of ITU-T Recommendation G.703 [8] and to the relevant values in table 11 of ITU-T Recommendation G.703 [8].	figure 24 of G.703 [8] table 11 of G.703 [8] ETS 300 166 [16]	c401	
2	The pulse shape characteristics - including peak-to-peak voltage, pulse width, "steady state" amplitude, pulse overshoot, rise time, decay time - is specified in the form of a mask. The negative pulse shape corresponding to a binary 1 is compliant to the mask in figure 25 of ITU-T Recommendation G.703 [8] and to the relevant values in table 11 of ITU-T Recommendation G.703 [8].	figure 25 of G.703 [8] table 11 of G.703 [8] ETS 300 166 [16]	c401	
3	Each pulse in a coded pulse sequence meets the limit of the relevant mask, irrespectively of the state of the preceding and succeeding pulse.	figures 24 and 25 of G.703 [8] note 3 figures 24 and 25 of G.703 [8] ETS 300 166 [16]	c401	
4	The return loss at the output port against 75 Ω is equal or greater than 15 dB in the frequency range from 8 MHz to 240 MHz.	ETS 300 166 [16] subclause 5.3	c401	
5	One coaxial pair in each direction is used.	table 11 of G.703 [8]	m	
6	The outer conductor of the output port is connected to signal ground.	ETS 300 166 [16] tables 1 to 12	c401	
7	The outer conductor of the input port is connected to signal ground.	ETS 300 166 [16] tables 1 to 12	c402	
8	The return loss at the input port against 75 Ω is equal or greater than 15 dB in the frequency range from 8 MHz to 240 MHz.	table 11 of G.703 [8]	c402	

c401: IF E.1/2 THEN m ELSE n/a -- ES1_TT_So function present
c402: IF E.1/3 THEN m ELSE n/a -- ES1_TT_Sk function present

E.5.4 ES1 to RS1 adaptation functions, ES1/RS1_A_So and ES1/RS1_A_Sk

Table E.5: Coding and regeneration of STM-1 signal

Item	Coding and regeneration of STM-1 signal	Reference	Status	Support
1.	The function provides CMI encoding of the ES1 signal.	8.3.1	c501	
2.	The function regenerates the received signal, recovers bit timing and frame start reference from it and provides CMI decoding of the STM-1 signal.	8.3.2	c502	
3.	The bit rate is locked to the synchronization signal provided by an SSU or SEC via the Synchronization Distribution Layer.	ETS 300 417-1-1 [1], subclause 10	c501	
4.	The signal accepted at the input port is as defined for output port but modified by the characteristics of the interconnecting coaxial pair (the attenuation follows a $\sqrt{f}$ law and the loss at 78 MHz is in the range 0 to 12,7 dB).	G.703 [8] , section 12.3	c501m	
5.	The port operates without any error when any combination of the following conditions apply to the input signal: - an input electrical signal amplitude with any value specified by ETS 300 166 [16] - jitter modulation applied to the input signal with any value defined in figure 2 and table 2 of ITU-T Recommendation G.825 [12]. - input bit rate in the range 155 520 kbit/s $\pm$ 20 ppm	8.3.2 G.823 [11], section 3.1.1 table 2 of G.823 [11] figure 3 of G.823 [11] table 2 of G.825 [12] figure 2 of G.825 [12]	c502m	
6.	In the absence of input jitter at the synchronization interface, the intrinsic jitter at the STM-1 output interface -measured over a 60 seconds interval- does not exceed 0,5 UI peak-peak when measured through band-pass filter with corner frequencies at 500 Hz and 1,3 MHz and low pass roll off of 60 dB/decade and high pass roll off of 20 dB/decade.	8.3.1	c501	
7.	In the absence of input jitter at the synchronization interface, the intrinsic jitter at the STM-1 output interface -measured over a 60 seconds interval- does not exceed 0,075 UI peak-to-peak when measured through a band-pass filter with corner frequencies at 65 kHz and 1,3 MHz and low pass roll off of 60 dB/decade and high pass roll off of 20 dB/decade.	8.3.1	c501	
8.	AIS generated by the ES1/RS1_A_Sk function replaces the regular signal when a defect is detected.	8.3.2	c502	

c501: IF E.1/4 THEN m ELSE n/a -- ES1/RS1_A_So function present
c502: IF E.1/5 THEN m ELSE n/a -- ES1/RS1_A_Sk function present

Table E.6: STM-1 frame alignment process

Prerequisite: E.1/5 – ES1/RS1_A_Sk adaptation function present

Item	STM-1 frame alignment process	Reference	Status	Support
1	The frame alignment is found by searching for the A1, A2 bytes contained in the STM-1 signal.	8.3.2	o.601	
2	The framing pattern searched for is a subset of the A1 and A2 bytes contained on the STM-1 signal.	8.3.2	o.601	
3	The frame signal is continuously checked with the presumed frame start position for the alignment.	8.3.2	m	
4	In the In-Frame (IF) status the maximum Out-Of-Frame (OOF) detection time is 625 μs for a random unframed signal.	8.3.2	m	
5	The algorithm used to check the alignment is such that in IF state, under normal condition, a 10^{-3} (Poisson type) error ratio will not cause false OOF more than once per 6 minutes (medium value).	8.3.2	m	
6	In the OOF state, the maximum frame alignment time is 250 μs for an error-free signal with no emulated frame pattern.	8.3.2	m	
7	The algorithm used to recover from the OOF state is such that the probability for false frame recovery with a random unframed signal is not more than 10^{-5} per 250 μs interval.	8.3.2	m	

o.601: it is mandatory to support only one of these items

E.6 ES1 layer defect, fault and performance monitoring tables

E.6.1 Port status management

Table E.7: STM-1 port status mode process

Prerequisite: E.1/3 – ES1_TT_Sk present

Item	ES1 port status mode process	Reference	Status	Support
1	The port status mode supports "not monitored" (NMON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
2	The port status mode supports "monitored" (MON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
3	The port status mode supports "automatic" (AUTO) status.	ETS 300 417-1-1 [1] subclause 8.5	o	
4	The AUTO status is left on clearing of dLOS.	ETS 300 417-1-1 [1] subclause 8.5	c701	
5	The port mode status is provisionable by the EMF.	8.2.2	m	

c1801: IF E.7/3 THEN m ELSE x

E.6.2 Defect detection and clearance criteria

Table E.8: Loss Of Signal defect (dLOS)

Prerequisite: E.1/3 – ES1_TT_Sk present

Item	Loss Of Signal defect (dLOS)	Reference	Status	Support
1	Loss of signal is detected when received amplitudes are less or equal to the level Q, as specified in ETS 300 417-1-1 [1], subclause 8.2.1.6, for a period from 10 to 255 UI.	ETS 300 417-1-1 [1], subclause 8.2.1.6	m	
2	Loss of signal is cleared when received amplitudes are greater or equal to the level P, as specified in ETS 300 417-1-1 [1], subclause 8.2.1.6, for a period from 10 to 255 UI.	ETS 300 417-1-1 [1], subclause 8.2.1.6	m	
3	Loss of signal is not detected when the received amplitude is between the minimum acceptable mplitude and the level P, as specified in ETS 300 417-1-1 [1], subclause 8.2.1.6.	ETS 300 417-1-1 [1], subclause 8.2.1.6	m	

Table E.9: Loss Of Frame defect (dLOF)

Prerequisite: E.1/5 – ES1/RS1_A_Sk adaptation function present

Item	Loss Of Frame defect (dLOF)	Reference	Status	Support
1	If the OOF anomaly persists for more than 3 ms, the function will enter the LOF state and a dLOF defect is declared.	8.3.2	m	
2	To provide for the case of intermittent OOFs, the integrating timer is not reset to zero until an In Frame (IF) condition persists continuously for at least 3 ms.	8.3.2	m	
3	Once in a LOF state, this state is exited when the IF state persists continuously for at least 3 ms.	8.3.2	m	

E.6.3 Consequent action activation and clearance criteria

Table E.10: ES1 Trail Signal Fail action (aTSF)

Prerequisite: E.1/3 – ES1_TT_Sk present

Item	ES1 Trail Signal Fail action (aTSF)	Reference	Status	Support
1	The aTSF signal is activated on detection of a dLOS defect in the trail termination sink function.	ETS 300 417-1-1 [1] subclause 8.2.2.5	m	
2	The aTSF signal is deactivated on clearance of a dLOS defect in the trail termination sink function.	ETS 300 417-1-1 [1] subclause 8.2.2.5	m	

Table E.11: ES1 Server Signal Fail action (aSSF)

Prerequisite: E.1/5 – ES1/RS1_A_Sk adaptation function present

Item	ES1 Server Signal Fail action (aSSF)	Reference	Status	Support
1	The aSSF is activated on detection of a dLOF defect.	8.3.2	m	
2	The aSSF is activated on reception of a AI_TSF.	8.3.2	m	
3	The aSSF signal is deactivated when the defect(s) which caused the aSSF generation is(are) no longer active and there are no other defects active.	ETS 300 417-1-1 [1] subclause 8.2.2.4	m	

Table E.12: Alarm Indication Signal action (aAIS)

Prerequisite: E.1/5 – ES1/RS1_A_Sk adaptation function present

Item	Alarm Indication Signal action (aAIS)	Reference	Status	Support
1	AIS is applied to the output data within 250 µs after AI_TSF reception.	8.3.2	m	
2	AIS is removed upon termination of the AI_TSF condition within 250 µs.	8.3.2	m	
3	AIS is applied to the output data within 250 µs after dLOF detection.	8.3.2	m	
4	AIS is removed upon termination of the dLOF condition within 250 µs.	8.3.2	m	

E.6.4 Defect correlation

Table E.13: Defect correlation

Item	Defect correlation	Reference	Status	Support
1	The cLOS is declared when dLOS defect is present and the port is the monitoring state (MON).	ETS 300 417-1-1 [1] subclauses 8.2.1.6, 8.3.1, 4.2.2	m	
2	The cLOS is cleared if dLOS defect is absent.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
3	The cLOF is declared if dLOF defect is present and no AI_TSF is received.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
4	The cLOF is cleared if dLOF defect is absent.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
5	All the generated fault cause (cXXX) are reported to the EMF.	ETS 300 417-1-1 [1] subclause 8.1, figure 36	m	

E.6.5 Performance monitoring

Table E.14: pOFS performance parameter

Item	pOFS performance parameter	Reference	Status	Support
1	Any second with at least one OOF event is reported as an Out Of Frame Second to the EMF.	8.3.2	m	

Annex F (normative): ICS proforma for E4 electrical section layer

F.1 Identification of the implementation

In this ETS, an IUT, and of course the identification of an IUT refer to an E4 layer instance implemented inside the SUT.

Identification of the IUT and the SUT should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the ICS should be named as the contact person.

F.1.1 Date of the statement

.....

F.1.2 IUT identification

IUT name:

.....

.....

IUT version

Hardware version:

.....

Software version:

.....

Firmware version:

.....

F.1.3 SUT identification

SUT name:

.....

.....

Hardware configuration:

.....

SUT Software version:

.....

SUT Firmware version:

.....

Operating system:

.....

F.1.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

F.1.5 Client

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

F.1.6 ICS contact person

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

F.2 Identification of the ETS

This ICS proforma applies to the following standard:

ETS 300 417-2-1 [2]: "Transmission and Multiplexing (TM); Generic functional requirements for SDH equipment: Physical section layer functions".

F.3 Global statement of conformance of E4 layer

Are all mandatory capabilities implemented? (Yes/No) .....

NOTE: Answering "No" to this question indicates non-conformance to the ETS specification. Non-supported mandatory capabilities are to be identified in the ICS, with an explanation of why the implementation is non-conforming, on pages attached to the ICS proforma.

Answering "Yes" to this question indicates only that all the capabilities with the explicit status "m" are supported. It is not necessary to fill in the support column of the associated item.

F.4 E4 layer description

Table F.1: E4 electrical section layer function

Item	E4 electrical section layer function	Reference	Status	Support
1	The E4 Section Layer supports an E4 Connection function.	9.1	o	
2	The E4 Section Layer contains an E4 Trail Termination Source function (E4_TT_So).	9.2.1	m	
3	The E4 Section Layer contains an E4 Trail Termination Sink function (E4_TT_Sk).	9.2.2	m	
4	The E4 Section Layer contains an E4 Section to P4x Adaptation Source function (E4/P4x_A_So).	9.3.1	o.1	
5	The E4 Section Layer contains an E4 Section to P4x Adaptation Sink function (E4/P4x_A_Sk).	9.3.2	c101	
6	The E4 Section Layer contains an E4 Section to P4e Adaptation Source function (E4/P4e_A_So).	9.3.3	o.1	
7	The E4 Section Layer contains an E4 Section to P4e Adaptation Sink function (E4/P4e_A_Sk).	9.3.4	c102	
8	The E4 Section Layer contains an E4 Section to P4s Adaptation Source function (E4/P4s_A_So).	9.3.5	o.1	
9	The E4 Section Layer contains an E4 Section to P4s Adaptation Sink function (E4/P4s_A_Sk).	9.3.6	c103	

c101: IF F.1/4 THEN m ELSE x
c102: IF F.1/6 THEN m ELSE x
c103: IF F.1/8 THEN m ELSE x
o.1: It is mandatory to support one or more of these functions

F.5 E4 layer transmission tables

F.5.1 E4 layer data stream

Table F.2: E4 signal

Item	E4 signal	Reference	Status	Support
1	The E4_CI of the intra-station layer CP is an electrical, digital signal of defined amplitude and pulse shape.	9	m	

F.5.2 E4 layer connection function, E4_C

Table F.3: E4 connection functionalities

Item	E4 connection functionalities	Reference	Status	Support
1	no requirement	9.1	n/a	

F.5.3 E4 layer trail termination functions, E4_TT_So and E4_TT_Sk

Table F.4: Electrical characteristics

Item	Electrical characteristics	Reference	Status	Support
1	The pulse shape characteristics of a ZERO - including peak-to-peak voltage, pulse width, "steady state" amplitude, pulse overshoot, rise time and decay time complies to the mask in figure 19 of ITU-T Recommendation G.703 [8].and to the relevant values in table 9 of ITU-T Recommendation G.703 [8].	figure 19 of G.703 [8] table 9 of G.703 [8]	m	
2	The pulse shape characteristics of a ONE - including peak-to-peak voltage, pulse width, "steady state" amplitude, pulse overshoot, rise time and decay time - complies to the mask in figure 20 of ITU-T Recommendation G.703 [8] and to the relevant values in table 9 of ITU-T Recommendation G.703 [8].	figure 20 of G.703 [8] table 9 of G.703 [8]	m	
3	Each pulse in a coded pulse sequence meets the limit of the relevant mask, irrespectively of the state of the preceding and succeeding pulse.	figure 19 of G.703 [8] ETS 300 166 [16], note 3	m	
4	The return loss at the output port against 75 Ω is equal or greater than 15 dB in the frequency range from 7 MHz to 210 MHz.	table 9 of G.703 [8]	m	
5	One coaxial pair in each direction is used.	table 9 of G.703 [8]	m	
6	The outer conductor of the output port is connected to signal ground.	ETS 300 166 [16] tables 1 to 8	m	
7	The outer conductor of the input port is connected to signal ground.	ETS 300 166 [16] tables 1 to 8	m	
8	The return loss at the input port against 75 Ω is equal to or greater than 15 dB in the frequency range from 7 MHz to 210 MHz.	G.703 [8], section 9.3	m	

F.5.4 E4 to P4x adaptation functions, E4/P4x_A_So and E4/P4x_A_Sk

Table F.5: Coding and regeneration of P4x signal

Prerequisite: F.1/4 -- E4/P4x adaptation functions are present

Item	Coding and regeneration of P4x signal	Reference	Status	Support
1	The function provides CMI encoding of the E4 signal.	9.3.1	m	
2	The function regenerates the received signal and recovers bit timing from it and CMI decodes the incoming electrical 139 264 kbit/s E4 signal.	9.3.2	m	
3	The bit rate at the output port in free-running mode is 139 264 kbit/s ± 15 ppm.	G.703 [8], section 9.1	m	
4	The bit rate accepted at the input port 139 264 kbit/s ± 15 ppm.	G.703 [8], section 9.1	m	
5	The signal accepted at the input port is as defined for output port but modified by the characteristics of the interconnecting coaxial pair (the attenuation follows a $\sqrt{f}$ law and the loss at 70 MHz is in the range 0 to 12 dB).	G.703 [8], section 9.3	m	
6	The port operates without any error when any combination of the following conditions apply to the input signal: - an input electrical signal amplitude with any value specified by ETS 300 166 [16]; - jitter modulation applied to the input signal with any value defined in figure 3 and table 2 of ITU-T Recommendation G.823 [11]; - input bit rate in the range 139 264 kbit/s ± 15 ppm.	9.3.2 G.823 [11], section 3.1.1 table 2 of G.823 [11] figure 3 of G.823 [11]	m	
7	The E4/P4x_A_So function does not add any jitter. The output jitter is the combination of the jitter generated and transferred via the client layer	9.3.1	m	
8	AIS generated by the E4/P4x_A_Sk function replaces the regular signal when a defect is detected.	9.3.2	m	

Table F.6: Activation and deactivation of E4/P4x adaptation function

Prerequisite: F.1/4 -- E4/P4x adaptation functions are present

Item	Activation and deactivation	Reference	Status	Support
1	The E4/P4x_A_So function source accesses the access point when it is activated (MI_Active is true); otherwise not.	9.3.1	m	
2	The E4/P4x_A_Sk function can be activated and deactivated.	9.3.2	c601	
3	The adaptation sink function performs the operation as specified when it is activated (MI_Active is true). Otherwise, it transmits the all-ONEs signal at its output (CI_D) and does not report its status via the management point.	9.3.2	m	

c601:IF F.1/5 AND (F.1/7 OR F.1/9)
THEN m
ELSE o

NOTE: Activation/deactivation is needed when two or more different types of adaptation functions are present

F.5.5 E4to P4e adaptation functions, E4/P4e_A_So and E4/P4e_A_Sk

Table F.7: Coding and regeneration of P4e signal

Prerequisite: F.1/6 -- E4/P4e adaptation functions are present

Item	Coding and regeneration of P4e signal	Reference	Status	Support
1	The function provides CMI encoding of the E4 signal.	9.3.3	m	
2	The function regenerates the received signal and recovers bit timing from it and CMI decodes the incoming electrical 139 264 kbit/s E4 signal.	9.3.4	m	
3	The bit rate at the output port in free-running mode is 139 264 kbit/s ± 15 ppm.	G.703 [8], section 9.1	m	
4	The bit rate accepted at the input port 139 264 kbit/s ± 15 ppm.	G.703 [8], section 9.1	m	
5	The signal accepted at the input port is as defined for output port but modified by the characteristics of the interconnecting coaxial pair (the attenuation follows a √f law and the loss at 70 MHz is in the range 0 to 12 dB).	G.703 [8], section 9.3	m	
6	The port operates without any error when any combination of the following conditions apply to the input signal: - an input electrical signal amplitude with any value specified by ETS 300 166 [16]; - jitter modulation applied to the input signal with any value defined in figure 3 and table 2 of ITU-T Recommendation G.823 [11]; - input bit rate in the range 139 264 kbit/s ± 15 ppm.	G.703 [8], section 9.3	m	
7	The E4/P4e_A_So function does not add any jitter. The output jitter is the combination of the jitter generated and transferred via the client layer.	9.3.4, G.823 [11], section 3.1.1, table 2 of G.823 [11], figure 3 of G.823 [11]	m	
8	AIS generated by the E4/P4e_A_Sk function replaces the regular signal when a defect is detected.	9.3.3	m	

Table F.8: E4/P4e frame alignment process

Prerequisite: F.1/6 -- E4/P4e adaptation functions are present

Item	E4/P4e frame alignment process	Reference	Status	Support
1	The frame alignment signal is inserted into the frame overhead bits 1 to 12.	9.3.3, table 2 of G.751 [10]	m	
2	The FAS is coded as 1111 1010 0000.	9.3.3, table 2 of G.751 [10]	m	
3	The frame alignment device should decide that the alignment has been recovered when it detects the presence of three consecutive frame alignment signals.	9.3.4, G.751 [10] section 1.5.3	m	
4	Loss Of frame alignment should be assumed to have taken place when four consecutive frame alignment signals have been incorrectly received in their predicted positions.	9.3.4, G.751 [10] section 1.5.3	m	
5	On detection of a single correct FAS a new search for FAS is started when the absence of the FAS in one of the two following frames is detected.	9.3.4, G.751 [10] section 1.5.3	m	

Table F.9: Activation and deactivation of E4/P4e adaptation function

Prerequisite: F.1/6 -- E4/P4e adaptation functions are present

Item	Activation and deactivation	Reference	Status	Support
1	The E4/P4e_A_So source function accesses the access point when it is activated (MI_Active is true); otherwise not.	9.3.3	m	
2	The E4/P4e_A_Sk function can be activated and deactivated.	9.3.4	c901	
3	The E4/P4e_A_Sk function performs the operation as specified when it is activated (MI_Active is true). Otherwise, it transmits the all-ONEs signal at its output (CI_D) and does not report its status via the management point.	9.3.4	m	

c901:IF F.1/7 AND (F.1/5 OR F.1/9)
THEN m
ELSE o

NOTE: Activation/deactivation is needed when two or more different types of adaptation functions are present.

F.5.6 E4 to P4s adaptation functions, E4/P4s_A_So and E4/P4s_A_Sk

Table F.10: Coding and regeneration of P4s signal

Prerequisite: F.1/8 -- E4/P4s adaptation functions are present

Item	Coding and regeneration of P4s signal	Reference	Status	Support
1	The function provides CMI encoding of the E4 signal.	9.3.5	m	
2	The function regenerates the received signal and recovers bit timing from it and CMI decodes the incoming electrical 139 264 kbit/s E4 signal.	9.3.6	m	
3	The bit rate at the output port in free-running mode is 139 264 kbit/s ± 15 ppm.	G.703 [8], section 9.1	m	
4	The bit rate accepted at the input port 139 264 kbit/s ± 15 ppm.	G.703 [8], section 9.1	m	
5	The signal accepted at the input port is as defined for output port but modified by the characteristics of the interconnecting coaxial pair (the attenuation follows a $\sqrt{f}$ law and the loss at 70 MHz is in the range 0 dB to 12 dB).	G.703 [8], section 9.3	m	
6	The port operates without any error when any combination of the following conditions apply to the input signal: - an input electrical signal amplitude with any value specified by ETS 300 166 [16]; - jitter modulation applied to the input signal with any value defined in figure 3 of and table 2 of ITU-T Recommendation G.823 [11]; - input bit rate in the range 139 264 kbit/s ± 15 ppm.	9.3.2 G.823 [11] section 3.1.1 table 2 of G.823 [11] figure 3 of G.823 [11]	m	
7	The E4/P4s_A_So function does not add any jitter. The output jitter is the combination of the jitter generated and transferred via the client layer.	9.3.5	m	
8	AIS generated by the E4/P4s_A_Sk function replaces the regular signal when a defect is detected.	9.3.6	m	

Table F.11: E4/P4s frame alignment process

Prerequisite: F.1/8 -- E4/P4s adaptation functions are present

Item	E4/P4s frame alignment process	Reference	Status	Support
1	The Frame Alignment signal is allocated to the FA1 and FA2 octets.	ETS 300 337 [15] subclause 6.1.2	m	
2	The FAS is coded as: 11110110 00101000.	ETS 300 337 [15] subclause 6.1.2	m	
3	The frame alignment is found by searching for the A1, A2 bytes contained in the 140 Mbit/s signal.	9.3.6	m	
4	The frame signal is continuously checked with the presumed frame start position for alignment.	9.3.6	m	
5	Frame alignment is deemed to have been lost when either: - four consecutive FAS are detected in error; or - 986 or more frames with one ore more BIP8 violations are detected in a block of 1 000 frames.	9.3.6	m	
6	Frame alignment is deemed to have been recovered, when three consecutive non-errored FAS are found.	9.3.6	m	

Table F.12: Activation and deactivation of E4/P4s adaptation function

Prerequisite: F.1/8 -- E4/P4s adaptation functions are present

Item	Activation and deactivation	Reference	Status	Support
1	The E4/P4s_A_Sk function accesses the access point when it is activated (MI_Active is true), otherwise not.	9.3.5	m	
2	The E4/P4s_A_Sk function can be activated and deactivated.	9.3.6	c1201	
3	The E4/P4s_A_Sk function performs the operation as specified when it is activated (MI_Active is true). Otherwise, it transmits the all-ONEs signal at its output (CI_D) and does not report its status via the management point.	9.3.6	m	

c1201: IF F.1/9 AND (F.1/5 OR F.1/7)
THEN m
ELSE o

NOTE: Activation/deactivation is needed when two or more different types of adaptation functions are present.

F.6 E4 layer defect, fault and performance monitoring tables

F.6.1 Port status management

Table F.13: E4 port status mode process

Item	E4 port status mode process	Reference	Status	Support
1	The port status mode supports "not monitored" (NMON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
2	The port status mode supports "monitored" (MON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
3	The port status mode supports "automatic" (AUTO) status.	ETS 300 417-1-1 [1] subclause 8.5	o	
4	The AUTO status is left on clearing of dLOS.	ETS 300 417-1-1 [1] subclause 8.5	c1301	
5	The port mode status is provisionable by the EMF.	9.2.2	m	

c1801: IF F.13/3 THEN m ELSE x

F.6.2 Defect detection and clearance criteria

Table F.14: E4 Loss Of Signal defect (dLOS)

Item	E4 Loss Of Signal defect (dLOS)	Reference	Status	Support
1	Loss of signal is detected when received amplitudes are less or equal to the level Q, as specified in ETS 300 417-1-1 [1], subclause 8.2.1.6, for a period from 10 to 255 UI.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	
2	Loss of signal is cleared when received amplitudes are greater or equal to the level P, as specified in ETS 300 417-1-1 [1], subclause 8.2.1.6, for a period from 10 to 255 UI.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	
3	Loss of signal is not detected when the received amplitude is between the minimum acceptable amplitude and the level P, as specified in ETS 300 417-1-1 [1], subclause 8.2.1.6.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	

Table F.15: E4 Loss Of Frame defect (dLOF)

Prerequisite: F.1/7 OR F. 1/9 – E4/P4e_A_Sk and/or E4/P4s_A_Sk adaptation functions present

Item	E4 Loss Of Frame defect (dLOF)	Reference	Status	Support
1	dLOF is detected if the frame alignment is deemed to be lost.	9.3.4, 9.3.6	m	
2	The dLOF defect is cleared when the frame alignment is deemed to have been recovered.	9.3.4, 9.3.6	m	

Table F.16: E4 AIS defect

Prerequisite: F.1/7 OR F.1/9 – E4/P4e_A_Sk and/or E4/P4s_A_Sk adaptation functions present

Item	E4 AIS defect	Reference	Status	Support
1	An AIS defect is detected when the received signal has 5 or less ZEROs in each of two consecutive 2 928 bit periods.	9.3.4, ETS 300 417-1-1 [1] subclause 8.2.1.7	c1601	
2	An AIS defect is cleared if each of two consecutive 2 928 bit periods contains 6 or more ZEROs.	9.3.4, ETS 300 417-1-1 [1] subclause 8.2.1.7	c1601	
3	An AIS defect is detected when the received signal has 7 or less ZEROs in each of two consecutive 17 408 bit periods.	9.3.6, ETS 300 417-1-1 [1] subclause 8.2.1.7	c1602	
4	An AIS defect is cleared if each of two consecutive 17 408 bit periods contains 8 or more ZEROs.	9.3.6, ETS 300 417-1-1 [1] subclause 8.2.1.7	c1602	

c1601: IF F.1/7 THEN m ELSE x
c1602: IF F.1/9 THEN m ELSE x

F.6.3 Consequent action activation and clearance criteria

Table F.17: E4 Trail Signal Fail action (aTSF)

Item	E4 Trail Signal Fail action (aTSF)	Reference	Status	Support
1	The aTSF signal is activated on detection of a dLOS defect in the trail termination sink function.	9.2.2, ETS 300 417-1-1 [1] subclause 8.2.2.5	m	
2	The aTSF signal is deactivated on clearance of a dLOS defect in the trail termination sink function.	9.2.2, ETS 300 417-1-1 [1] subclause 8.2.2.5	m	

Table F.18: E4 Server Signal Fail action (aSSF)

Item	E4 Server Signal Fail action (aSSF)	Reference	Status	Support
1	The aSSF is activated on detection of a dLOF defect.	9.3.4, 9.3.6, ETS 300 417-1-1 [1] subclause 8.2.2.4	c1801	
2	The aSSF is activated on detection of a dAIS.	9.3.4, 9.3.6, ETS 300 417-1-1 [1] subclause 8.2.2.4	c1801	
3	The aSSF is activated on reception of a AI_TSF.	9.3.2, 9.3.4, 9.3.6, ETS 300 417-1-1 [1] subclause 8.2.2.4	m	
4	The aSSF signal is deactivated when the defect(s) which caused the aSSF generation is(are) no longer active and there are no other defects active.	9.3.2, 9.3.4, 9.3.6, ETS 300 417-1-1 [1] subclause 8.2.2.4	m	

c1801: IF (F.1/7 OR F.1/9) THEN m ELSE n/a -- E4/P4e_A_Sk and/or E4/P4s_A_Sk function present

Table F.19: Alarm Indication Signal action (aAIS)

Item	Alarm Indication Signal action (aAIS)	Reference	Status	Support
1	AIS is applied to the output data within 250 µs after AI_TSF reception.	9.3.2, 9.3.4, 9.3.6	m	
2	AIS is removed upon termination of the aTSF condition within 250 µs.	9.3.2, 9.3.4, 9.3.6	m	
3	AIS is applied to the output data within 250 µs after dLOF detection.	9.3.4, 9.3.6	c1901	
4	AIS is removed upon termination of the dLOF condition within 250 µs.	9.3.4, 9.3.6	c1901	
5	AIS is applied to the output data within 250 µs after dAIS detection.	9.3.4, 9.3.6	c1901	
6	AIS is removed upon termination of the dAIS condition within 250 µs.	9.3.4, 9.3.6	c1901	

c1901: IF F.1/7 OR F.1/9 THEN m ELSE x

F.6.4 Defect correlation

Table F.20: Defect correlation

Item	Defect correlation	Reference	Status	Support
1	The cLOS is declared when dLOS defect is present and the port is the monitoring state (MON).	4.2.2, ETS 300 417-1-1 [1] subclauses 8.3.1, 8.2.1.6	m	
2	The cLOS is cleared if dLOS defect is absent.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
3	The dLOF defect detection generates a cLOF report when the dLOS has not been detected.	ETS 300 417-1-1 [1] subclause 8.2.3	c2001	
4	The cAIS is declared when dAIS defect is detected and no AI_TSF is received.	9.3.4, 9.3.6	c2001	
5	The cAIS is cleared when dAIS defect is no more detected.	9.3.4, 9.3.6	c2001	
6	The cAIS is reported only if selected E4 AIS_reported is set to TRUE by the NEM. By default E4 AIS_reported is set to FALSE.	9.3.4, 9.3.6	c2001	
7	All the generated fault cause (cXXX) are reported to the EMF.	ETS 300 417-1-1 [1] subclause 8.1, figure 36	m	

c2001: IF F.1/7 OR F.1/9 THEN m ELSE x

Annex G (normative): ICS proforma for E31 electrical section layer

G.1 Identification of the implementation

In this ETS, an IUT, and of course the identification of an IUT refer to an E31 layer instance implemented inside the SUT.

Identification of the IUT and the SUT should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the ICS should be named as the contact person.

G.1.1 Date of the statement

.....

G.1.2 IUT identification

IUT name:

.....

.....

IUT version

Hardware version:

.....

Software version:

.....

Firmware version:

.....

G.1.3 SUT identification

SUT name:

.....

.....

Hardware configuration:

.....

SUT Software version:

.....

SUT Firmware version:

.....

Operating system:

.....

G.1.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

G.1.5 Client

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

G.1.6 ICS contact person

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

G.2 Identification of the ETS

This ICS proforma applies to the following standard:

ETS 300 417-2-1 [2]: "Transmission and Multiplexing (TM); Generic functional requirements for SDH equipment: Physical section layer functions".

G.3 Global statement of conformance of E31 layer

Are all mandatory capabilities implemented? (Yes/No) .....

NOTE: Answering "No" to this question indicates non-conformance to the ETS specification. Non-supported mandatory capabilities are to be identified in the ICS, with an explanation of why the implementation is non-conforming, on pages attached to the ICS proforma.

Answering "Yes" to this question indicates only that all the capabilities with the explicit status "m" are supported. It is not necessary to fill in the support column of the associated item.

G.4 E31 layer description

Table G.1: E31 electrical section layer function

Item	E31 electrical section layer function	Reference	Status	Support
1	The E31 Section Layer supports an E31 Connection function.	10.1	o	
2	The E31 Section Layer contains an E31 Trail Termination Source function (E31_TT_So).	10.2.1	m	
3	The E31 Section Layer contains an E31 Trail Termination Sink function (E31_TT_Sk).	10.2.2	m	
4	The E31 Section Layer contains an E31 Section to P31x Adaptation Source function (E31/P31x_A_So).	10.3.1	o.101	
5	The E31 Section Layer contains an E31 Section to P31x Adaptation Sink function (E31/P31x_A_Sk).	10.3.2	c101	
6	The E31 Section Layer contains an E31 Section to P31e Adaptation Source function (E31/P31e_A_So).	10.3.3	o.101	
7	The E31 Section Layer contains an E31 Section to P31e Adaptation Sink function (E31/P31e_A_Sk).	10.3.4	c102	
8	The E31 Section Layer contains an E31 Section to P31s Adaptation Source function (E31/P31s_A_So).	10.3.5	o.101	
9	The E31 Section Layer contains an E31 Section to P31s Adaptation Sink function (E31/P31s_A_Sk).	10.3.6	c103	

c101: IF G.1/4 THEN m ELSE x
c102: IF G.1/6 THEN m ELSE x
c103: IF G.1/8 THEN m ELSE x
o.101: It is mandatory to support one or more of these functions

G.5 E31 layer transmission tables

G.5.1 E31 layer data stream

Table G.2: E31 signal

Item	E31 signal	Reference	Status	Support
1	The E31_CI of the intra-station layer CP is an electrical, digital signal of defined amplitude and pulse shape.	10	m	

G.5.2 E31 layer connection function, E31_C

Table G.3: E31 connection functionalities

Item	E31 connection functionalities	Reference	Status	Support
1	no requirement	10.1	n/a	

G.5.3 E31 layer trail termination functions, E31_TT_So and E31_TT_Sk

Table G.4: Electrical characteristics

Item	Electrical characteristics	Reference	Status	Support
1	The pulse shape characteristics - including nominal peak voltages, nominal pulse width, ratio of amplitudes at the nominal centre width, ratio of widths at the nominal centre amplitude - is specified in the form of a mask. The pulse shape is compliant to the mask in figure 17 of ITU-T Recommendation G.703 [8] and to the relevant values in table 8 of ITU-T Recommendation G.703 [8].	figure 17 of G.703 [8] table 8 of G.703 [8]	m	
2	The impedance at the output port is resistive and equal to 75 Ω.	table 8 of G.703 [8]	m	
3	The return loss against 75 Ω of the output port is greater than or equal to the minimum values.	ETS 300 166 [16] subclause 5.3	m	
4	One coaxial pair in each direction is used.	table 8 of G.703 [8]	m	
5	The outer conductor of the output port is connected to signal ground.	ETS 300 166 [16] table 1/8	m	
6	The outer conductor of the input port is connected to signal ground.	ETS 300 166 [16] table 1/8	m	
7	The impedance at the input port is resistive and equal to 75 Ω.	table 8 of G.703 [8]	m	
8	The return loss against 75 Ω of the input port is greater than or equal to the minimum values.	G.703 [8], section 8.3.3	m	

G.5.4 E31 to P31x adaptation functions, E31/P31x_A_So and E31/P31x_A_Sk

Table G.5: Coding and regeneration of P31x signal

Prerequisite: G.1/4 -- E31/P31x adaptation functions are present

Item	Coding and regeneration of P31x signal	Reference	Status	Support
1	The E31/P31x_A_So function provides HDB3 encoding of the 34 368 kbit/s signal.	10.3.1	m	
2	The E31/P31x_A_Sk function regenerates the received signal and recovers bit timing from it and HDB3 decodes the incoming electrical 34 368 kbit/s E31 signal.	10.3.2	m	
3	The bit rate at the output port in free-running mode is 34 368 kbit/s ± 20 ppm.	G.703 [8], section 8.1	m	
4	The bit rate accepted at the input port is 34 368 kbit/s ± 20 ppm.	G.703 [8], section 8.1	m	
5	The signal accepted at the input port is as defined for output port but modified by the characteristics of the interconnecting coaxial pair (the attenuation follows a √f law and the loss at 17 184 kHz is in the range 0 to 12 dB).	G.703 [8], section 8.3.1	m	
6	Immunity against signal reflection guarantees a no-error condition with a signal-to-interference ratio of 20 dB.	G.703 [8], section 8.3.4	m	
7	The port operates without any error when any combination of the following conditions apply to the input signal: - an input electrical signal amplitude with any value specified by ETS 300 166 [16]; - jitter modulation applied to the input signal with any value defined in figure 3 and table 2 of ITU-T Recommendation G.823 [11]; - input bit rate in the range 34 368 kbit/s ± 20 ppm.	10.3.2, G.823 [11], section 3.1.1 table 2 of G.823 [11] figure 3 of G.823 [11]	m	
8	The E31/P31x_A_So function does not add any jitter. The output jitter is the combination of the jitter generated and transferred via the client layer.	10.3.1	m	
9	AIS generated by the E31/P31x_A_Sk function replaces the regular signal when a defect is detected.	10.3.2	m	

Table G.6: Activation and deactivation of E31/P31x adaptation function

Prerequisite: G.1/4 -- E31/P31x adaptation functions are present

Item	Activation and deactivation	Reference	Status	Support
1	The E31/P31x_A_So function source accesses the access point when it is activated (MI_Active is true); otherwise not.	10.3.1	m	
2	The E31/P31x_A_Sk function can be activated and deactivated.	10.3.2	c701	
3	The adaptation sink function performs the operation as specified when it is activated (MI_Active is true). Otherwise, it transmits the all-ONEs signal at its output (CI_D) and does not report its status via the management point.	10.3.2	m	

c701:IF G.1/5 AND (G.1/7 OR G.1/9)
THEN m
ELSE o

NOTE: Activation/deactivation is needed when two or more different types of adaptation functions are present.

G.5.5 E31to P31e adaptation functions, E31/P31e_A_So and E31/P31e_A_Sk

Table G.7: Coding and regeneration of P31e signal

Prerequisite: G.1/6 -- E31/P31e adaptation functions are present

Item	Coding and regeneration of P31e signal	Reference	Status	Support
1	The E31/P31e_A_So function provides HDB3 encoding of the 34 368 kbit/s signal.	10.3.3	m	
2	The E31/P31e_A_Sk function regenerates the received signal, recovers bit timing and frame start reference from it and HDB3 decodes the incoming electrical 34 368 kbit/s E31 signal.	10.3.4	m	
3	The bit rate at the output port in free-running mode is 34 368 kbit/s ± 20 ppm.	G.703 [8], section 8.1	m	
4	The bit rate accepted at the input port is 34 368 kbit/s ± 20 ppm.	G.703 [8], section 8.1	m	
5	The signal accepted at the input port is as defined for output port but modified by the characteristics of the interconnecting coaxial pair (the attenuation follows a √f law and the loss at 17 184 kHz is in the range 0 to 12 dB).	G.703 [8], section 8.3.1	m	
6	Immunity against signal reflection guarantees a no-error condition with a signal-to-interference ratio of 20 dB.	G.703 [8], section 8.3.4	m	
7	The port operates without any error when any combination of the following conditions apply to the input signal: - an input electrical signal amplitude with any value specified by ETS 300 166 [16]; - jitter modulation applied to the input signal with any value defined in figure 3 and table 2 of ITU-T Recommendation G.823 [11]; - input bit rate in the range 34 368 kbit/s ± 20 ppm	10.3.4, G.823 [11], section 3.1.1, table 2 of G.823 [11], figure 3 of G.823 [11]	m	
8	The E31/P31e_A_So function does not add any jitter. The output jitter is the combination of the jitter generated and transferred via the client layer.	10.3.1	m	
9	AIS generated by the E31/P31e_A_Sk function replaces the regular signal when a defect is detected.	10.3.2	m	

Table G.8: E31/P31e frame alignment process

Prerequisite: G.1/6 -- E31/P31e adaptation functions are present

Item	E31/P31e frame alignment process	Reference	Status	Support
1	The frame alignment signal is inserted into the frame overhead bits 1 to 10.	10.3.3, table 1 of G.751 [10]	m	
2	The FAS is coded as 1111 0100 00.	10.3.3, table 1 of G.751 [10]	m	
3	The frame alignment device should decide that the alignment has been recovered when it detects the presence of three consecutive frame alignment signals.	10.3.4, G.751 [10] 1.4.3	m	
4	Loss of frame alignment should be assumed to have taken place when four consecutive frame alignment signals have been incorrectly received in their predicted positions.	10.3.4, G.751 [10] 1.4.3	m	
5	The frame alignment device having detected the appearance of a single correct frame alignment signal should begin a new search for the frame alignment signal when it detects the absence of the frame alignment signal in one of the two following frames.	10.3.4, G.751 [10] 1.4.3	m	

Table G.9: Activation and deactivation of E31/P31e adaptation function

Prerequisite: G.1/6 -- E31/P31e adaptation functions are present

Item	Activation and deactivation	Reference	Status	Support
1	The E31/P31e_A_So source function accesses the access point when it is activated (MI_Active is true); otherwise not.	10.3.3	m	
2	The E31/P31e_A_Sk function can be activated and deactivated.	10.3.4	c901	
3	The E31/P31e_A_Sk function performs the operation as specified when it is activated (MI_Active is true). Otherwise, it transmits the all-ONEs signal at its output (CI_D) and does not report its status via the management point.	10.3.4	m	

c901:IF G.1/7 AND (G.1/5 OR G.1/9)
THEN m
ELSE o

NOTE: Activation/deactivation is needed when two or more different types of adaptation functions are present.

G.5.6 E31 to P31s adaptation functions, E31/P31s_A_So and E31/P31s_A_Sk

Table G.10: Coding and regeneration of P31s signal

Prerequisite: G.1/8 -- E31/P31s adaptation functions are present

Item	Coding and regeneration of P31s signal	Reference	Status	Support
1	The E31/P31s_A_So function provides HDB3 encoding of the 34 368 kbit/s signal.	10.3.5	m	
2	The E31/P31s_A_Sk function regenerates the received signal, recovers bit timing, HDB3 decodes the incoming electrical 34 368 kbit/s E31 signal and recovers frame start reference.	10.3.6	m	
3	The bit rate at the output port in free-running mode is 34 368 kbit/s ± 20 ppm.	G.703 [8] section 8.1	m	
4	The bit rate accepted at the input port is 34 368 kbit/s ± 20 ppm.	G.703 [8] section 8.1	m	
5	The signal accepted at the input port is as defined for output port but modified by the characteristics of the interconnecting coaxial pair (the attenuation follows a $\sqrt{f}$ law and the loss at 17 184 kHz is in the range 0 to 12 dB).	G.703 [8] section 8.3.1	m	
6	Immunity against signal reflection guarantees a no-error condition with a signal-to-interference ratio of 20 dB.	G.703 [8] section 8.3.4	m	
7	The port operates without any error when any combination of the following conditions apply to the input signal: - an input electrical signal amplitude with any value specified by ETS 300 166 [16]; - jitter modulation applied to the input signal with any value defined in figure 3 and table 2 of ITU-T Recommendation G.823 [11]; - input bit rate in the range 34 368 kbit/s ± 20 ppm.	G.823 [11] section 3.1.1 table 2 of G.823 [11] figure 3 of G.823 [11] 10.3.2	m	
8	The E31/P31s_A_So function does not add any jitter. The output jitter is the combination of the jitter generated and transferred via the client layer.	10.3.1	m	
9	AIS generated by the E31/P31s_A_Sk function replaces the regular signal when a defect is detected.	10.3.2	m	

Table G.11: E31/P31s frame alignment process

Prerequisite: G.1/8 -- E31/P31s adaptation functions are present

Item	E31/P31s frame alignment process	Reference	Status	Support
1	The Frame Alignment signal is allocated to the FA1 and FA2 octets.	ETS 300 337 [15] subclause 5.1.2	m	
2	The FAS is coded as: 11110110 00101000.	ETS 300 337 [15] subclause 5.1.2	m	
3	The frame alignment is found by searching for the A1, A2 bytes contained in the 34 Mbit/s signal.	10.3.6	m	
4	The frame signal is continuously checked with the presumed frame start position for alignment.	10.3.6	m	
5	Frame alignment is deemed to have been lost when either: - four consecutive FAS are detected in error; or - 986 or more frames with one ore more BIP8 violations are detected in a block of 1 000 frames.	10.3.6	m	
6	Frame alignment is deemed to have been recovered, when three consecutive non-errored FAS are found.	10.3.6	m	

Table G.12: Activation and deactivation of E31/P31s adaptation function

Prerequisite: G.1/8 -- E31/P31s adaptation functions are present

Item	Activation and deactivation	Reference	Status	Support
1	The E31/P31s_A_Sk function accesses the access point when it is activated (MI_Active is true), otherwise not.	10.3.5	m	
2	The E31/P31s_A_Sk function can be activated and deactivated.	10.3.6	c1201	
3	The E31/P31s_A_Sk function performs the operation as specified when it is activated (MI_Active is true). Otherwise, it transmits the all-ONEs signal at its output (CI_D) and does not report its status via the management point.	10.3.6	m	

c1201:IF G.1/9 AND (G.1/5 OR G.1/7)
THEN m
ELSE o

NOTE: Activation/deactivation is needed when two or more different types of adaptation functions are present.

G.6 E31 layer defect, fault and performance monitoring tables

G.6.1 Port status management

Table G.13: E31 port status mode process

Item	E 31 port status mode process	Reference	Status	Support
1	The port status mode supports "not monitored" (NMON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
2	The port status mode supports "monitored" (MON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
3	The port status mode supports "automatic" (AUTO) status.	ETS 300 417-1-1 [1] subclause 8.5	o	
4	The AUTO status is left on clearing of dLOS.	ETS 300 417-1-1 [1] subclause 8.5	c1301	
5	The port mode status is provisionable by the EMF.	10.2.2	m	

c1801: IF G.13/3 THEN m ELSE x

G.6.2 Defect detection and clearance criteria

Table G.14: E31 Loss Of Signal defect (dLOS)

Item	E31 Loss Of Signal defect (dLOS)	Reference	Status	Support
1	Loss of signal is detected when received amplitudes are less than or equal to the level Q, as specified in ETS 300 417-1-1 [1], subclause 8.2.1.6, for a period from 10 to 255 UI.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	
2	Loss of signal is cleared when received amplitudes are greater than or equal to the level P, as specified in ETS 300 417-1-1 [1], subclause 8.2.1.6, for a period from 10 to 255 UI.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	
3	Loss of signal is not detected when the received amplitude is between the minimum acceptable amplitude and the level P, as specified in ETS 300 417-1-1 [1], subclause 8.2.1.6.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	

Table G.15: E31 Loss Of Frame defect (dLOF)

Prerequisite: G.1/6 OR G.1/8 -- E31/P31e or E31/P31s adaptation functions are present

Item	E31 Loss Of Frame defect (dLOF)	Reference	Status	Support
1	dLOF is detected if the frame alignment is deemed to be lost.	10.3.4, 10.3.6	m	
2	The dLOF defect is cleared when the frame alignment is deemed to have been recovered.	10.3.4, 10.3.6	m	

Table G.16: E31 AIS defect

Item	E31 AIS defect	Reference	Status	Support
1	An AIS defect is detected when the received signal has 4 or less ZEROs in each of two consecutive 1 536 bit periods.	10.3.4, ETS 300 417-1-1 [1] subclause 8.2.1.7	c1601	
2	An AIS defect is cleared if each of two consecutive 1 536 bit periods contains 5 or more ZEROs.	10.3.4, ETS 300 417-1-1 [1] subclause 8.2.1.7	c1601	
3	An AIS defect is detected when the received signal has 7 or less ZEROs in each of two consecutive 4 296 bit periods.	10.3.6, ETS 300 417-1-1 [1] subclause 8.2.1.7	c1602	
4	An AIS defect is cleared if each of two consecutive 4 296 bit periods contains 8 or more ZEROs.	10.3.6, ETS 300 417-1-1 [1] subclause 8.2.1.7	c1602	

C1601: IF G.1/7 THEN m ELSE n/a
C1602: IF G.1/9 THEN m ELSE n/a

G.6.3 Consequent action activation and clearance criteria

Table G.17: E31 Trail Signal Fail action (aTSF)

Item	E31 Trail Signal Fail action (aTSF)	Reference	Status	Support
1	The aTSF signal is activated on detection of a dLOS defect in the trail termination sink function.	10.2.2, ETS 300 417-1-1 [1] subclause 8.2.2.5	m	
2	The aTSF signal is deactivated on clearance of a dLOS defect in the trail termination sink function.	10.2.2, ETS 300 417-1-1 [1] subclause 8.2.2.5	m	

Table G.18: E 31 Server Signal Fail action (aSSF)

Item	E 31 Server Signal Fail action (aSSF)	Reference	Status	Support
1	The aSSF is activated on detection of a dLOF defect.	10.3.4, 10.3.6, ETS 300 417-1-1 [1] subclause 8.2.2.4	c1801	
2	The aSSF is activated on detection of a dAIS.	10.3.4, 10.3.6, ETS 300 417-1-1 [1] subclause 8.2.2.4	c1801	
3	The aSSF is activated on detection of an AI_TSF.	10.3.2, 10.3.4, 10.3.6, ETS 300 417-1-1 [1] subclause 8.2.2.4	m	
4	The aSSF signal is deactivated when the defect(s) which caused the aSSF generation is(are) no longer active and there are no other defects active.	10.3.2, 10.3.4, 10.3.6, ETS 300 417-1-1 [1] subclause 8.2.2.4	m	

c1801: IF (G.1/7 OR G.1/9) THEN m ELSE n/a -- E31/P31e_A_Sk and/or E31/P31s_A_Sk function present

Table G.19: Alarm Indication Signal action (aAIS)

Item	Alarm Indication Signal action (aAIS)	Reference	Status	Support
1	AIS is applied to the output data within 250 µs after AI_TSF reception.	10.3.2, 10.3.4, 10.3.6	m	
2	AIS is removed upon termination of the AI_TSF condition within 250 µs.	10.3.2, 10.3.4, 10.3.6	m	
3	AIS is applied to the output data within 2 frames (250 µs) after dLOF detection.	10.3.4, 10.3.6	c1901	
4	AIS is removed upon termination of the dLOF condition within 250 µs.	10.3.4, 10.3.6	c1901	
5	AIS is applied to the output data within 250 µs after dAIS detection.	10.3.4, 10.3.6	c1901	
6	AIS is removed upon termination of the dAIS condition within 250 µs.	10.3.4, 10.3.6	c1901	

c1901: IF G.1/7 OR G.1/9 THEN m ELSE n/a

G.6.4 Defect correlation

Table G.20: Defect correlation

Item	Defect correlation	Reference	Status	Support
1	The cLOS is declared when dLOS defect is present and the port is the monitoring state (MON).	4.2.2, ETS 300 417-1-1 [1] subclauses 8.2.1.6, 8.3.1	m	
2	The cLOS is cleared if dLOS defect is absent.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
3	The dLOF defect detection generates a cLOF report when the dLOS has not been detected.	ETS 300 417-1-1 [1] subclause 8.2.3	c2001	
4	The cAIS is declared when dAIS defect is detected and no AI_TSF is received.	10.3.4, 10.3.6	c2001	
5	The cAIS is cleared when dAIS defect is no more detected.	10.3.4, 10.3.6	c2001	
6	The cAIS is reported only if selected E31 AIS_reported is set to TRUE by the NEM. By default E31 AIS_reported is set to FALSE.	10.3.4, 10.3.6	c2001	
7	All the generated fault cause (cXXX) are reported to the EMF.	ETS 300 417-1-1 [1] subclause 8.1, figure 36	m	

c2001: IF G.1/7 OR G.1/9 THEN m ELSE n/a

Annex H (normative): ICS proforma for E22 electrical section layer

H.1 Identification of the implementation

In this ETS, an IUT, and of course the identification of an IUT refer to an E22 layer instance implemented inside the SUT.

Identification of the IUT and the SUT should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the ICS should be named as the contact person.

H.1.1 Date of the statement

.....

H.1.2 IUT identification

IUT name:

.....

.....

IUT version

Hardware version:

.....

Software version:

.....

Firmware version:

.....

H.1.3 SUT identification

SUT name:

.....

.....

Hardware configuration:

.....

SUT Software version:

.....

SUT Firmware version:

.....

Operating system:

.....

H.1.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

H.1.5 Client

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

H.1.6 ICS contact person

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

H.2 Identification of the ETS

This ICS proforma applies to the following standard:

ETS 300 417-2-1 [2]: "Transmission and Multiplexing (TM); Generic functional requirements for SDH equipment: Physical section layer functions".

H.3 Global statement of conformance of E22 layer

Are all mandatory capabilities implemented? (Yes/No) .....

NOTE: Answering "No" to this question indicates non-conformance to the ETS specification. Non-supported mandatory capabilities are to be identified in the ICS, with an explanation of why the implementation is non-conforming, on pages attached to the ICS proforma.

Answering "Yes" to this question indicates only that all the capabilities with the explicit status "m" are supported. It is not necessary to fill in the support column of the associated item.

H.4 E22 layer description

Table H.1: E22 electrical section layer function

Item	E22 electrical section layer function	Reference	Status	Support
1	The E22 Section Layer supports a E22 Connection function.	11.1	o	
2	The E22 Section Layer contains an E22 Trail Termination Source function (E22_TT_So).	11.2.1	m	
3	The E22 Section Layer contains an E22 Trail Termination Sink function (E22_TT_Sk).	11.2.2	m	
4	The E22 Section Layer contains an E22 Section to P22x Adaptation Source function (E22/P22x_A_So).	11.3.1	o.101	
5	The E22 Section Layer contains an E22 Section to P22x Adaptation Sink function (E22/P22x_A_Sk).	11.3.2	c101	
6	The E22 Section Layer contains an E22 Section to P22e Adaptation Source function (E22/P22e_A_So).	11.3.3	o.101	
7	The E22 Section Layer contains an E22 Section to P22e Adaptation Sink function (E22/P22e_A_Sk).	11.3.4	c102	

c101: IF H.1/4 THEN m ELSE x
c102: IF H.1/6 THEN m ELSE x
o.101: It is mandatory to support one or more of these functions

H.5 E22 layer transmission tables

H.5.1 E22 layer data stream

Table H.2: E22 signal

Item	E22 signal	Reference	Status	Support
1	Is the E22_CI of the intra-station layer CP an electrical, digital signal of defined amplitude and pulse shape.	11	m	

H.5.2 E22 layer connection function, E22_C

Table H.3: E22 connection functionalities

Item	E22 connection functionalities	Reference	Status	Support
1	no requirement	11.1	n/a	

H.5.3 E22 layer trail termination functions, E22_TT_So and E22_TT_Sk

Table H.4: Electrical characteristics

Item	Electrical characteristics	Reference	Status	Support
1	The pulse shape characteristics - including nominal peak voltages, nominal pulse width, ratio of amplitudes at the nominal centre width, ratio of widths at the nominal centre amplitude - is specified in the form of a mask. The pulse shape is compliant to the mask in figure 16 of ITU-T Recommendation G.703 [8] and to the relevant values in table 7 of ITU-T Recommendation G.703 [8].	figure 16 of G.703 [8] table 7 of G.703 [8]	m	
2	The impedance at the output port is resistive and equal to 75 Ω.	table 7 of G.703 [8]	m	
3	The return loss against 75 Ω of the output port is greater than or equal to the minimum values.	ETS 300 166 [16] subclause 5.3	m	
4	One coaxial pair in each direction is used.	table 7 of G.703 [8]	m	
5	The outer conductor of the output port is connected to signal ground.	ETS 300 166 [16] tables 1 to 7	m	
6	The outer conductor of the input port is connected to signal ground.	ETS 300 166 [16] tables 1 to 7	m	
7	The impedance at the input port is resistive and equal to 75 Ω.	table 7 of G.703 [8]	m	
8	The return loss against 75 Ω of the input port is greater than or equal to the minimum values.	G.703 [8], section 7.3.3	m	

H.5.4 E22 to P22x adaptation functions, E22/P22x_A_So and E22/P22x_A_Sk

Table H.5: Coding and regeneration of P22x signal

Prerequisite: H.1/4 -- E22/P22x adaptation functions are present

Item	Coding and regeneration of P22x signal	Reference	Status	Support
1	The E22/P22x_A_So function provides HDB3 encoding of the 8 448 kbit/s signal.	11.3.1	m	
2	The E22/P22x_A_Sk function regenerates the received signal and recovers bit timing from it and HDB3 decodes the incoming electrical the 8 448 kbit/s E22 signal.	11.3.2	m	
3	The bit rate at the output port in free-running mode is 8 448 kbit/s ± 20 ppm.	G.703 [8], section 7.1	m	
4	The bit rate accepted at the input port is 8 448 kbit/s ± 30 ppm.	G.703 [8], section 7.1	m	
5	The signal accepted at the input port is as defined for output port but modified by the characteristics of the interconnecting coaxial pair (the attenuation follows a √f law and the loss at 4 224 kHz is in the range 0 to 6 dB).	G.703 [8], section 7.3.1	m	
6	Immunity against signal reflection guarantees a no-error condition with a signal-to-interference ratio of 20 dB.	G.703 [8], section 7.3.4	m	
7	The port operates without any error when any combination of the following conditions apply to the input signal: - an input electrical signal amplitude with any value specified by ETS 300 166 [16]; - jitter modulation applied to the input signal with any value defined in figure 3 and table 2 of ITU-T Recommendation G.823 [11]; - input bit rate in the range 8 448 kbit/s ± 30 ppm.	11.3.2 G.823 [11], section 3.1.1 table 2 of G.823 [11] figure 3 of G.823 [11]	m	
8	The E22/P22x_A_So function does not add any jitter. The output jitter is the combination of the jitter generated and transferred via the client layer.	11.3.1	m	
9	AIS generated by the E22/P22x_A_Sk function replaces the regular signal when a defect is detected.	11.3.2	m	

Table H.6: Activation and deactivation of E22/P22x adaptation function

Prerequisite: H.1/4 -- E22/P22x adaptation functions are present

Item	Activation and deactivation	Reference	Status	Support
1	The E22/P22x_A_So function source accesses the access point when it is activated (MI_Active is true); otherwise not.	11.3.1	m	
2	The E22/P22x_A_Sk function can be activated and deactivated.	11.3.2	c701	
3	The adaptation sink function performs the operation as specified when it is activated (MI_Active is true). Otherwise, it transmits the all-ONEs signal at its output (CI_D) and does not report its status via the management point.	11.3.2	m	

c701: IF (H.1/5 AND H.1/7) THEN m ELSE n/a

H.5.5 E22to P22e adaptation functions, E22/P22e_A_So and E22/P22e_A_Sk

Table H.7: Coding and regeneration of P22e signal

Prerequisite: H.1/6 -- E22/P22e adaptation functions are present

Item	Coding and regeneration of P22e signal	Reference	Status	Support
1	The E22/P22e_A_So function provides HDB3 encoding of the 8 448 kbit/s signal.	11.3.3	m	
2	The E22/P22e_A_Sk function regenerates the received signal, recovers bit timing and frame start reference from it and HDB3 decodes the incoming electrical 8 448 bit/s E22 signal.	11.3.4	m	
3	The bit rate at the output port in free-running mode is 8 448 kbit/s ± 30 ppm.	G.703 [8], section 7.1	m	
4	The bit rate accepted at the input port is 8 448 kbit/s ± 30 ppm..	G.703 [8], section 7.1	m	
5	The signal accepted at the input port is as defined for output port but modified by the characteristics of the interconnecting coaxial pair (the attenuation follows a √f law and the loss at 4 224 kHz is in the range 0 to 6 dB).	G.703 [8], section 7.3.1	m	
6	Immunity against signal reflection guarantees a no-error condition with a signal-to-interference ratio of 20 dB.	G.703 [8], section 7.3.4	m	
7	The port operates without any error when any combination of the following conditions apply to the input signal: - an input electrical signal amplitude with any value specified by ETS 300 166 [16]; - jitter modulation applied to the input signal with any value defined in figure 3 and table 2 of ITU-T Recommendation G.823 [11]; - input bit rate in the range 8 448 kbit/s ± 30 ppm.	11.3.4, G.823 [11], section 3.1.1, table 2 of G.823 [11], figure 3 of G.823 [11]	m	
8	The E22/P22e_A_So function does not add any jitter. The output jitter is the combination of the jitter generated and transferred via the client layer.	11.3.1	m	
9	AIS generated by the E22/P22e_A_Sk function replaces the regular signal when a defect is detected.	11.3.2	m	

Table H.8: E22/P22e frame alignment process

Prerequisite: H.1/6 -- E22/P22e adaptation functions are present

Item	E22/P22e frame alignment process	Reference	Status	Support
1	The frame alignment signal is inserted into the frame overhead bits 1 to 10.	11.3.3, table 1 of G.742 [21]	m	
2	The FAS is coded as 1111 0100 00.	11.3.3, table 1 of G.742 [21]	m	
3	The frame alignment device decides that the alignment has been recovered when it detects the presence of three consecutive frame alignment signals.	11.3.4, G.742 [21], clause 4	m	
4	Loss of frame alignment should be assumed to have taken place when four consecutive frame alignment signals have been incorrectly received in their predicted positions.	11.3.4, G.742 [21], clause 4	m	
5	The frame alignment device having detected the appearance of a single correct frame alignment signal should begin a new search for the frame alignment signal when it detects the absence of the frame alignment signal in one of the two following frames.	11.3.4 G.742 [21], clause 4	m	

Table H.9: Activation and deactivation of E22/P22e adaptation function

Prerequisite: H.1/6 -- E22/P22e adaptation functions are present

Item	Activation and deactivation	Reference	Status	Support
1	The E22/P22e_A_So source function accesses the access point when it is activated (MI_Active is true); otherwise not.	11.3.3	m	
2	The E22/P22e_A_Sk function can be activated and deactivated.	11.3.4	c901	
3	The E22/P22e_A_Sk function performs the operation as specified when it is activated (MI_Active is true). Otherwise, it transmits the all-ONEs signal at its output (CI_D) and does not report its status via the management point.	11.3.4	m	

c901: IF (H.1/5 AND H.1/7) THEN m ELSE o

H.6 E22 layer defect, fault and performance monitoring tables

H.6.1 Port status management

Table H.10: E22 port status mode process

Item	E22 port status mode process	Reference	Status	Support
1	The port status mode supports "not monitored" (NMON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
2	The port status mode supports "monitored" (MON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
3	The port status mode supports "automatic" (AUTO) status.	ETS 300 417-1-1 [1] subclause 8.5	o	
4	The AUTO status is left on clearing of dLOS.	ETS 300 417-1-1 [1] subclause 8.5	c1001	
5	The port mode status is provisionable by the EMF.	11.2.2	m	

c1801: IF H.10/3 THEN m ELSE x

H.6.2 Defect detection and clearance criteria

Table H.11: E22 Loss Of Signal defect (dLOS)

Item	E22 Loss Of Signal defect (dLOS)	Reference	Status	Support
1	Loss of signal is detected when received amplitudes are less or equal the level Q for a period from 10 to 255 UI.	ETS 300 417-1-1 [1], subclause 8.2.1.6	m	
2	Loss of signal is cleared when received amplitudes are greater or equal the level P for a period from 10 to 255 UI.	ETS 300 417-1-1 [1], subclause 8.2.1.6	m	
3	Loss of signal is not detected when the received amplitude is between the minimum acceptable amplitude and the level P, as specified in ETS 300 417-1-1 [1], subclause 8.2.1.6.	ETS 300 417-1-1 [1], subclause 8.2.1.6	m	

Table H.12: E22 Loss Of Frame defect (dLOF)

Prerequisite: H.1/7– E22/P22e_A_Sk adaptation functions present

Item	E22 Loss Of Frame defect (dLOF)	Reference	Status	Support
1	dLOF is detected if the frame alignment is deemed to be lost.	11.3.4	m	
2	The dLOF defect is cleared when the frame alignment is deemed to have been recovered.	11.3.4	m	

Table H.13: E22 AIS defect

Prerequisite: H.1/7– E22/P22e_A_Sk adaptation functions present

Item	E22 AIS defect	Reference	Status	Support
1	An AIS defect is detected when the received signal has 4 or less ZEROs in each of two consecutive 848 bit periods.	11.3.4, ETS 300 417-1-1 [1] subclause 8.2.1.7	m	
2	An AIS defect is cleared if each of two consecutive 848 bit periods contains 5 or more ZEROs.	11.3.4, ETS 300 417-1-1 [1] subclause 8.2.1.7	m	

H.6.3 Consequent action activation and clearance criteria

Table H.14: E22 Trail Signal Fail action (aTSF)

Item	E22 Trail Signal Fail action (aTSF)	Reference	Status	Support
1	The aTSF signal is activated on detection of a dLOS defect in the trail termination sink function.	11.2.2, ETS 300 417-1-1 [1] subclause 8.2.2.5	m	
2	The aTSF signal is deactivated on clearance of a dLOS defect in the trail termination sink function.	11.2.2, ETS 300 417-1-1 [1] subclause 8.2.2.5	m	

Table H.15: E 22 Server Signal Fail action (aSSF)

Item	E22 Server Signal Fail action (aSSF)	Reference	Status	Support
1	The aSSF is activated on detection of a dLOF defect.	11.3.4, ETS 300 417-1-1 [1] subclause 8.2.2.4	c1501	
2	The aSSF is activated on detection of a dAIS.	11.3.4, ETS 300 417-1-1 [1] subclause 8.2.2.4	c1501	
3	The aSSF is activated on reception of a AI_TSF.	11.3.2, 11.3.4, ETS 300 417-1-1 [1] subclause 8.2.2.4	m	
4	The aSSF signal is deactivated when the defect(s) which caused the aSSF generation is(are) no longer active and there are no other defects active.	11.3.2, 11.3.4, ETS 300 417-1-1 [1] subclause 8.2.2.4	m	

c1501: IF H.1/7 THEN m ELSE n/a -- E22/P22s_A_Sk function present

Table H.16: Alarm Indication Signal action (aAIS)

Item	Alarm Indication Signal action (aAIS)	Reference	Status	Support
1	AIS is applied to the output data within 250 µs after AI_TSF reception.	11.3.2, 11.3.4	m	
2	AIS is removed upon termination of the AI_TSF condition within 250 µs.	11.3.2, 11.3.4	m	
3	AIS is applied to the output data within 250 µs after dLOF detection.	11.3.4	c1601	
4	AIS is removed upon termination of the dLOF condition within 250 µs.	11.3.4	c1601	
5	AIS is applied to the output data within 250 µs after dAIS detection	11.3.4	c1601	
6	AIS is removed upon termination of the dAIS condition within 250 µs.	11.3.4	c1601	

c1601: IF H.1/7 THEN m ELSE n/a

H.6.4 Defect correlation

Table H.17: Defect correlation

Item	Defect correlation	Reference	Status	Support
1	The cLOS is declared when dLOS defect is present and the port is the monitoring state (MON).	4.2.2, ETS 300 417-1-1 [1] subclauses 8.2.1.6, 8.3.1	m	
2	The cLOS is cleared if dLOS defect is absent.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
3	The dLOF defect detection generates a cLOF report when the dLOS has not been detected.	ETS 300 417-1-1 [1] subclause 8.2.3	c1701	
4	The cAIS is declared when dAIS defect is detected and no AI_TSF is received.	11.3.4,	c1701	
5	The cAIS is cleared when dAIS defect is no more detected.	11.3.4	c1701	
6	The cAIS is reported only if selected E22 AIS_reported is set to TRUE by the NEM. By default E22 AIS_reported is set to FALSE.	11.3.4	c1701	
7	All the generated fault cause (cXXX) are reported to the EMF.	ETS 300 417-1-1 [1] subclause 8.1, figure 36	m	

c1701: IF H.1/7 m ELSE n/a

Annex J (normative): ICS proforma for E12 electrical section layer

J.1 Identification of the implementation

In this ETS, an IUT, and of course the identification of an IUT refers to an E12 layer instance implemented inside the SUT.

Identification of the IUT and the SUT should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the ICS should be named as the contact person.

J.1.1 Date of the statement

.....

J.1.2 IUT identification

IUT name:

.....

.....

IUT version

Hardware version:

.....

Software version:

.....

Firmware version:

.....

J.1.3 SUT identification

SUT name:

.....

.....

Hardware configuration:

.....

SUT Software version:

.....

SUT Firmware version:

.....

Operating system:

.....

J.1.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

J.1.5 Client

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

J.1.6 ICS contact person

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

J.2 Identification of the ETS

This ICS proforma applies to the following standard:

ETS 300 417-2-1 [2]: "Transmission and Multiplexing (TM); Generic functional requirements for SDH equipment: Physical section layer functions".

J.3 Global statement of conformance of E12 layer

Are all mandatory capabilities implemented? (Yes/No) .....

NOTE: Answering "No" to this question indicates non-conformance to the ETS specification. Non-supported mandatory capabilities are to be identified in the ICS, with an explanation of why the implementation is non-conforming, on pages attached to the ICS proforma.

Answering "Yes" to this question indicates only that all the capabilities with the explicit status "m" are supported. It is not necessary to fill in the support column of the associated item.

J.4 E12 layer description

Table J.1: E12 electrical section layer function

Item	E12 electrical section layer function	Reference	Status	Support
1	The E12 Section Layer supports a E12 Connection function.	12.1	o	
2	The E12 Section Layer contains an E12 Trail Termination Source function (E12_TT_So).	12.2.1	m	
3	The E12 Section Layer contains an E12 Trail Termination Sink function (E12_TT_Sk).	12.2.2	m	
4	The E12 Section Layer contains an E12 Section to P12x Adaptation Source function (E12/P12x_A_So).	12.3.1	o.101	
5	The E12 Section Layer contains an E12 Section to P12x Adaptation Sink function (E12/P12x_A_Sk).	12.3.2	c101	
6	The E12 Section Layer contains an E12 Section to P12s Adaptation Source function (E12/P12s_A_So).	12.3.3	o.101	
7	The E12 Section Layer contains an E12 Section to P12s Adaptation Sink function (E12/P12s_A_Sk).	12.3.4	c102	

c101: IF J.1/4 THEN m ELSE x
c102: IF J.1/6 THEN m ELSE x
o.101: It is mandatory to support one or more of these functions

Table J.2: CRC-4 functions

Prerequisite: IF J.1/7 THEN m ELSE n/a

Item	CRC-4 functions	Reference	Status	Support
1	The E12 Section to P12s Adaptation Sink function uses the manual interworking mode between CRC-4 and non-CRC-4.	12.3.4	o.201	
2	The E12 Section to P12s Adaptation Sink function uses the automatic interworking mode between CRC-4 and non-CRC-4.	12.3.4	o.201	
3	The E12 Section to P12s Adaptation Sink function supports the fixed present CRC-4 mode.	12.3.4	c201	
4	The E12 Section to P12s Adaptation Sink function supports the fixed absent CRC-4 mode.	12.3.4	c201	

o.201: It is mandatory to support one or more of these functions
c201: IF J.2/1 THEN m ELSE x

J.5 E12 layer transmission tables

J.5.1 E12 layer data stream

Table J.3: E12 signal

Item	E12 signal	Reference	Status	Support
1	The E12_CI of the intra-station layer CP is an electrical, digital signal of defined amplitude and pulse shape.	13	m	

J.5.2 E12 electrical section connection function, E12_C

Table J.4: E12 connection functionalities

Item	E12 connection functionalities	Reference	Status	Support
1	no requirement	12.1	n/a	

J.5.3 E12layer trail termination functions, E12_TT_So and E12_TT_Sk

Table J.5: Interface type

Item	Interface type	Reference	Status	Support
1	The interface is balanced with an impedance of 120 Ω.	table 6 of G.703 [8]	o.501	
2	The interface is coaxial with an impedance of 75 Ω.	table 6 of G.703 [8]	o.501	

o.501: It is mandatory to support exactly one of these items -- one characteristic impedance defined

Table J.6: Electrical characteristics for 120 Ω balanced interface

Prerequisite: J.5/1 -- 120 Ω balanced interface

Item	Electrical characteristics	Reference	Status	Support
1	The pulse shape characteristics of a mark - including peak voltage, nominal amplitude of 3,0 V, pulse width, "steady state" amplitude, pulse overshoot, rise time and decay time complies to the mask in figure 15 of ITU-T Recommendation G.703 [8] and to the relevant values in table 6 of ITU-T Recommendation G.703 [8] when the test load impedance at the output port is resistive and equal to 120 Ω.	figure 15 of G.703 [8] table 6 of G.703 [8]	m	
2	The pulse shape characteristics of a space - including peak voltage, nominal amplitude of 0,3 V, pulse width, "steady state" amplitude, pulse overshoot, rise time and decay time - complies to the mask in figure 15 of ITU-T Recommendation G.703 [8] and to the relevant values in table 6 of ITU-T Recommendation G.703 [8] when the test load impedance at the output port is resistive and equal to 120 Ω.	figure 15 of G.703 [8] table 6 of G.703 [8]	m	
3	The return loss against 120 Ω of the output port is greater than or equal to the minimum values.	ETS 300 166 [16] subclause 5.3	m	
4	The output signal balance is greater or equal to minimum values specified in ETS 300 166 [16], subclause 5.2.	ETS 300 166 [16] subclause 5.2	m	
5	One balanced pair in each direction is used.	table 6 of G.703 [8]	m	
6	The output port provides a signal reference point for connecting the screen of the balanced pair.	ETS 300 166 [16] tables 1 to 6	m	
7	The input port provides a signal reference point for connecting the screen of the balanced pair.	ETS 300 166 [16] tables 1 to 6	m	
8	The impedance at the input port is resistive and equal to 120 Ω.	table 6 of G.703 [8]	m	
9	The return loss against 120 Ω of the input port is greater than or equal to the minimum values.	G.703 [8], section 6.3.3	m	

Table J.7: Electrical characteristics for 75 Ω coaxial interface

Prerequisite: (J.5/2): -- 75 Ω coaxial interface

Item	Electrical characteristics	Reference	Status	Support
1	The pulse shape characteristics of a mark - including peak voltage, nominal amplitude of 2,37 V, pulse width, "steady state" amplitude, pulse overshoot, rise time and decay time complies to the mask in figure 15 of ITU-T Recommendation G.703 [8].and to the relevant values in table 6 of ITU-T Recommendation G.703 [8] when the impedance at the output port is resistive and equal to 75 Ω.	figure 15 of G.703 [8] table 6 of G.703 [8]	m	
2	The pulse shape characteristics of a space - including voltage, nominal amplitude of 0,237 V, pulse width, "steady state" amplitude, pulse overshoot, rise time and decay time - complies to the mask in figure 15 of ITU-T Recommendation G.703 [8] and to the relevant values in table 6 of ITU-T Recommendation G.703 [8] when the impedance at the output port is resistive and equal to 75 Ω.	figure 15 of G.703 [8] table 6 of G.703 [8]	m	
3	The return loss against 75 Ω of the output port is greater than or equal to the minimum values	ETS 300 166 [16] subclause 5.3	m	
4	One coaxial pair in each direction is used.	table 6 of G.703 [8]	m	
5	The outer conductor of the output port is connected to signal ground.	ETS 300 166 [16] tables 1 to 6	m	
6	The outer conductor of the input port is connected to signal ground.	ETS 300 166 [16] tables 1 to 6	m	
7	The impedance at the input port is resistive and equal to 75 Ω.	table 6 of G.703 [8]	m	
8	The return loss against 75 Ω of the input port is greater than or equal to the minimum values	G.703 [8], section 6.3.3	m	

J.5.4 E12 to P12x adaptation functions, E12/P12x_A_So and E12/P12x_A_Sk

Table J.8: Coding and regeneration of P12x signal

Prerequisite: J.1/4 -- E12/P12x adaptation functions are present

Item	Coding and regeneration of P12x signal	Reference	Status	Support
1	The E12/P12x_A_So function provides HDB3 encoding of the 2 048 kbit/s signal.	12.3.1	m	
2	The E12/P12x_A_Sk function regenerates the received signal and recovers bit timing from it and HDB3 decodes the incoming electrical the 2 048 kbit/s E12 signal.	12.3.2	m	
3	The bit rate at the output port in free-running mode is 2 048 kbit/s ± 50 ppm.	G.703 [8], section 6.1	m	
4	The bit rate accepted at the input port 2 048 kbit/s ± 50 ppm.	G.703 [8], section 6.1	m	
5	The signal accepted at the input port is as defined for output port but modified by the characteristics of the interconnecting pair (the attenuation follows a √f law and the loss at 1 024 kHz is in the range 0 dB to 6 dB).	G.703 [8], section 6.3	m	
6	The port operates without any error when any combination of the following conditions apply to the input signal: - an input electrical signal amplitude with any value specified by ETS 300 166 [16]; - jitter modulation applied to the input signal with any value defined in figure 3 of and table 2 of ITU-T Recommendation G.823 [11]; - input bit rate in the range 2 048 kbit/s ± 50 ppm; - the input signal has an interfering signal specified by ETS 300 166 [16]; - the input signal has a longitudinal voltage specified by ETS 300 166 [16].	12.3.2 G.823 [11], section 3.1.1, table 2 of G.823 [11] figure 3 of G.823 [11]	c701	
7	The port operates without any error when any combination of the following conditions apply to the input signal: - an input electrical signal amplitude with any value specified by ETS 300 166 [16]; - jitter modulation applied to the input signal with any value defined in figure 3 of and table 2 of ITU-T Recommendation G.823 [11]; - input bit rate in the range 2 048 kbit/s ± 50 ppm; - the input signal has an interfering signal specified by ETS 300 166 [16].	12.3.2 G.823 [11], section 3.1.1 table 2 of G.823 [11] figure 3 of G.823 [11]	c702	
8	The E12/P12x_A_So function does not add any jitter. The output jitter is the combination of the jitter generated and transferred via the client layer.	12.3.1	m	

c701: IF J.5/1 THEN m ELSE x
c702: IF (NOT J.5/1) THEN m ELSE x

Table J.9: Activation and deactivation of E12/P12x adaptation function

Prerequisite: J.1/4 -- E12/P12x adaptation functions are present

Item	Activation and deactivation	Reference	Status	Support
1	The E12/P12x_A_So function source accesses the access point when it is activated (MI_Active is true); otherwise not.	12.3.1	m	
2	The E12/P12x_A_Sk function can be activated and deactivated.	12.3.2	c801	
3	The adaptation sink function performs the operation as specified when it is activated (MI_Active is true). Otherwise, it transmits the all-ONEs signal at its output (CI_D) and does not report its status via the management point.	12.3.2	c801	

c801: IF (J.1/5 AND J.1/7) THEN m ELSE o

J.5.5 E12 to P12s adaptation functions, E12/P12s_A_So and E12/P12s_A_Sk

Table J.10: Coding and regeneration of P12s signal

Prerequisite: J.1/6 -- E12/P12s adaptation functions are present

Item	Coding and regeneration of P12s signal	Reference	Status	Support
1	The E12/P12s_A_So function provides HDB3 encoding of the 2 048 kbit/s signal.	12.3.3	m	
2	The E12/P12s_A_Sk function regenerates the received signal and recovers bit timing from it and HDB3 decodes the incoming electrical the 2 048 kbit/s E12 signal.	12.3.4	m	
3	The bit rate at the output port in free-running mode is 2 048 kbit/s ± 50 ppm.	G.703 [8], section 6.1	m	
4	The bit rate accepted at the input port 2 048 kbit/s ± 50 ppm.	G.703 [8], section 6.1	m	
5	The signal accepted at the input port is as defined for output port but modified by the characteristics of the interconnecting pair (the attenuation follows a √f law and the loss at 1 024 kHz is in the range 0 dB to 6 dB).	G.703 [8], section 6.3	m	
6	The port operates without any error when any combination of the following conditions apply to the input signal: - an input electrical signal amplitude with any value specified by ETS 300 166 [16]; - jitter modulation applied to the input signal with any value defined in figure 3 and table 2 of ITU-T Recommendation G.823 [11]; - input bit rate in the range 2 048 kbit/s ± 50 ppm; - the input signal has an interfering signal specified by ETS 300 166 [16]; - the input signal has a longitudinal voltage specified by ETS 300 166 [16].	12.3.4 G.823 [11], section 3.1.1 table 2 of G.823 [11] figure 3 of G.823 [11]	c901	
7	The port operates without any error when any combination of the following conditions apply to the input signal: - an input electrical signal amplitude with any value specified by ETS 300 166 [16]; - jitter modulation applied to the input signal with any value defined in figure 3 and table 2 of ITU-T Recommendation G.823 [11]; - input bit rate in the range 2 048 kbit/s ± 50 ppm; - the input signal has an interfering signal specified by ETS 300 166 [16].	12.3.4 G.823 [11], section 3.1.1 table 2 of G.823 [11] figure 3 of G.823 [11]	c902	
8	The E12/P12s_A_So function does not add any jitter. The output jitter is the combination of the jitter generated and transferred via the client layer.	12.3.3	m	
9	AIS generated by the E12/P12s_A_Sk function replaces the regular signal when a defect is detected.	12.3.4	m	

c901: IF J.5/1 THEN m ELSE x
c902: IF (NOT J.5/1) THEN m ELSE x

Table J.11: E12/P12s basic frame alignment process

Prerequisite: J.1/6 -- E12/P12s adaptation functions are present

Item	E12/P12s basic frame alignment process	Reference	Status	Support
1	The frame alignment signal is allocated to bits 2-8 of the proper frames.	G.704 [9] section 2.3.2 table 5a of G.704 [9]	m	
2	The frame alignment signal is coded as 0011011.	G.704 [9] section 2.3.2 table 5a of G.704 [9]	m	
3	Bit 2 of time slot 0 not containing FAS is coded ONE	G.704 [9] section 2.3.2 table 5a of G.704 [9]	m	
4	The frame alignment is found when the following sequence is detected: - for the first time, the presence of the correct FAS the absence of FAS in the following frame by verifying that bit 2 of the basic frame is ONE; - for the second time, the presence of correct FAS in the next frame.	G.706 [22] section 4.1.2	m	
5	When a valid frame alignment signal is detected in frame n, a check is made to ensure that a frame alignment signal does not exist in frame n+1, and also that a frame alignment signal exists in frame n+2. Failure to meet one or both of these requirements causes a new search to be initiated in frame n+2.	G.706 [22] section 4.1.2	o	
6	Basic frame alignment is deemed to have been lost when three consecutive FAS are detected in error or	G.706 [22] section 4.1.1	m	
7	Basic frame alignment is deemed to have been lost when three consecutive bit 2 are detected in error (ZERO)	G.706 [22] section 4.1.1	o	
8	Basic frame alignment is deemed to have been lost when 915 or more CRC-4 blocks in a second or out of 1 000 CRC-4 blocks are detected in error.	G.706 [22] section 4.1.1	c.1201	

c1201: IF J.2/3 THEN m ELSE n/a

Table J.12: CRC-4 multiframe alignment process

Prerequisite: J.1/7 -- CRC-4 function is present in E12/P12s_A_Sk

Item	CRC-4 multiframe alignment process	Reference	Status	Support
1	The CRC-4 multiframe alignment signal is allocated to bit 1 of time slot 0 not containing the FAS.	G.704 [9] section 2.3.3.1	m	
2	The multiframe alignment word is coded.	G.704 [9] section 2.3.3.1	m	
3	A multiframe is composed of 16 basic frames.	G.704 [9] section 2.3.3.1	m	
4	A multiframe consist of two SMF each forming a 1 ms CRC block.	13, G.704 [9] section 2.3.3.1	m	
5	When a condition of assumed frame alignment has been achieved, CRC multiframe alignment is deemed to have occurred if at least two valid CRC multiframe alignment signal can be located within 8 ms and the time separating the two CRC multiframes is 2 ms or multiple of 2 ms.	G.706 [22] section 4.2	m	
6	If the multiframe alignment can not be achieved within 8 ms, it is assumed that basic frame alignment is due to a spurious FAS and a re-search for FAS is initiated.	G.706 [22] section 4.2	m	
7	The re-search for FAS is started at a point just after the location of the assumed spurious FAS.	G.706 [22] section 4.2	m	
8	Consequent action taken as a result of loss of basic frame alignment are no longer taken when multiframe alignment has been recovered.	G.706 [22] section 4.2	m	
9	When multiframe alignment cannot be achieved in the range from 100 ms to 500 ms loss of basic frame alignment is assumed until multiframe alignment is recovered.	G.706 [22] section 4.2	c1201	
10	When multiframe alignment is not achieved 400 ms after the detection of basic frame alignment the adaptation sink turns to a non-CRC mode.	G.706 [22] section 4.2	c1202	

c1201: IF J.2/3 THEN m ELSE x
c1202: IF J.2/2 THEN m ELSE x

Table J.13: Activation and deactivation of E12/P12s adaptation function

Prerequisite: J.1/6 OR J.1/7 -- E12/P12s adaptation functions are present

Item	Activation and deactivation	Reference	Status	Support
1	The E12/P12s_A_So function accesses the access point when it is activated (MI_Active is true), otherwise not.	12.3.3	m	
2	The E12/P12s_A_Sk function can be activated and deactivated.	12.3.4	c1301	
3	The E12/P12s_A_Sk function performs the operation as specified when it is activated (MI_Active is true). Otherwise, it transmits the all-ONEs signal at its output (CI_D) and does not report its status via the management point.	12.3.4	c1301	

c1301: IF (J.1/5 AND J.1/7) THEN m ELSE n/a

Table J.14: CRC4 management function

Prerequisite: J.1/7 -- E12/P12s adaptation functions are present

Item	CRC4 management function	Reference	Status	Support
1	The E12/P12s_A_Sk function supports the input signal E12/P12s_A_Sk_MI_CRC4mode.	12.3.3, 12.3.4	c1401	
2	The E12/P12s_A_Sk function supports the output signal E12/P12s_A_Sk_MI_NCI.	12.3.3, 12.3.4	c1401	

c1401: IF J.2/2 THEN m ELSE n/a

J.6 E12 layer defect, fault and performance monitoring tables

J.6.1 Port status management

Table J.15: E12 port status mode process

Item	E12 port status mode process	Reference	Status	Support
1	The port status mode supports "not monitored" (NMON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
2	The port status mode supports "monitored" (MON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
3	The port status mode supports "automatic" (AUTO) status.	ETS 300 417-1-1 [1] subclause 8.5	o	
4	The AUTO status is left on clearing of dLOS.	ETS 300 417-1-1 [1] subclause 8.5	c1501	
5	The port mode status is provisionable by the EMF.	12.2.2	m	

c1801: IF J.15/3 THEN m ELSE x

J.6.2 Defect detection and clearance criteria

Table J.16: E12 Loss Of Signal defect (dLOS)

Item	E12 Loss Of Signal defect (dLOS)	Reference	Status	Support
1	Loss of signal is detected when received amplitudes are less than or equal to the level Q as specified by ETS 300 417-1-1 [1], subclause 8.2.1.6 for a period from 10 to 255 UI.	ETS 300 417-1-1 [1], subclause 8.2.1.6	m	
2	Loss of signal is not detected when received amplitudes are between the minimum accepted level and the level P for a period from 10 to 255 UI.	ETS 300 417-1-1 [1], subclause 8.2.1.6	m	
3	Loss of signal is cleared when the received amplitudes are greater than or equal to the level P, as specified by ETS 300 417-1-1 [1], subclause 8.2.1.6, for a period from 10 to 255 UI.	ETS 300 417-1-1 [1], subclause 8.2.1.6	m	

Table J.17: E12 Loss Of Frame defect (dLOF)

Prerequisite: J.1/6 -- E12/P12s adaptation functions is present

Item	E12 Loss Of Frame defect (dLOF)	Reference	Status	Support
1	dLOF is detected if the frame alignment is deemed to be lost.	12.3.4	m	
2	The dLOF defect is cleared when the frame alignment is deemed to have been recovered.	12.3.4	m	

Table J.18: E12 AIS defect

Prerequisite: J.1/7 -- E12/P12s_A_Sk function is present

Item	E12 AIS defect	Reference	Status	Support
1	An AIS defect is detected when the received signal has 2 or less ZEROs in each of two consecutive 512 bit periods.	12.3.4 ETS 300 417-1-1 [1] subclause 8.2.1.7	m	
2	An AIS defect is cleared if each of two consecutive 512 bit periods contains 3 or more ZEROs.	12.3.4 ETS 300 417-1-1 [1] subclause 8.2.1.7	m	

J.6.3 Consequent action activation and clearance criteria

Table J.19: E12 Trail Signal Fail action (aTSF)

Item	E12 Trail Signal Fail action (aTSF)	Reference	Status	Support
1	The aTSF signal is activated on detection of a dLOS defect in the trail termination sink function.	12.2.2, ETS 300 417-1-1 [1] subclause 8.2.2.5	m	
2	The aTSF signal is deactivated on clearance of a dLOS defect in the trail termination sink function.	12.2.2, ETS 300 417-1-1 [1] subclause 8.2.2.5	m	

Table J.20: E12 Server Signal Fail action (aSSF)

Item	E12 Server Signal Fail action (aSSF)	Reference	Status	Support
1	The aSSF is activated on detection of dLOF defect.	12.3.4, ETS 300 417-1-1 [1] subclause 8.2.2.4	c2001	
2	The aSSF is activated on detection of dAIS.	12.3.4, ETS 300 417-1-1 [1] subclause 8.2.2.4	c2001	
3	The aSSF is activated on detection of AI_TSF.	12.3.2, 12.3.4, ETS 300 417-1-1 [1] subclause 8.2.2.4	m	
4	The aSSF signal is deactivated when the defect(s) which caused the aSSF generation is(are) no more active and there are no other defects active.	12.3.2, 12.3.4, ETS 300 417-1-1 [1] subclause 8.2.2.4	m	

c2001: IF J.1/7 THEN m ELSE n/a -- E12/P12s_A_Sk function present

Table J.21: Alarm Indication Signal action (aAIS)

Item	Alarm Indication Signal action (aAIS)	Reference	Status	Support
1	AIS is applied to the output data within 250 µs since AI_TSF reception.	12.3.2, 12.3.4	m	
2	AIS is removed upon termination of the AI_TSF condition within 250 µs.	12.3.2, 12.3.4	m	
3	AIS is applied to the output data within 250 µs since dLOF detection.	12.3.4	c2101	
4	AIS is removed upon termination of the dLOF condition within 250 µs.	12.3.4	c2101	
5	AIS is applied to the output data within 250 µs since dAIS detection.	12.3.4	c2101	
6	AIS is removed upon termination of the dAIS condition within 250 µs.	12.3.4	c2101	

c2101: IF J.1/7 THEN m ELSE n/a

J.6.4 Defect correlation

Table J.22: Defect correlation

Item	Defect correlation	Reference	Status	Support
1	The cLOS is declared when dLOS defect is present the port is the monitoring state (MON).	ETS 300 417-1-1 [1] subclauses 8.2.1.6, 8.3.1, 4.2.2	m	
2	The cLOS is cleared if dLOS defect is absent.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
3	The dLOF defect detection generates a cLOF report when the dLOS has not been detected.	ETS 300 417-1-1 [1] subclause 8.2.3	c2201	
4	The cAIS is declared when dAIS defect is detected and no AI_TSF is received.	12.3.4, 12.3.6	c2201	
5	The cAIS is cleared when dAIS defect is no more detected.	12.3.4, 12.3.6	c2201	
6	The cAIS is reported only if selected E12 AIS_reported is set to TRUE by the NEM. By default E12 AIS_reported is set to FALSE.	12.3.4, 12.3.6	c2201	
7	All the generated fault cause (cXXX) are reported to the EMF.	ETS 300 417-1-1 [1] subclause 8.1, figure 36	m	

c2201: IF J.1/7 THEN m ELSE n/a

Annex K (normative): ICS proforma for T12 electrical section layer

K.1 Identification of the implementation

In this ETS, an IUT, and of course the identification of an IUT refer to an T12 layer instance implemented inside the SUT.

Identification of the IUT and the SUT should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the ICS should be named as the contact person.

K.1.1 Date of the statement

.....

K.1.2 IUT identification

IUT name:

.....

.....

IUT version

Hardware version:

.....

Software version:

.....

Firmware version:

.....

K.1.3 SUT identification

SUT name:

.....

.....

Hardware configuration:

.....

SUT Software version:

.....

SUT Firmware version:

.....

Operating system:

.....

K.1.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

K.1.5 Client

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

K.1.6 ICS contact person

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

K.2 Identification of the ETS

This ICS proforma applies to the following standard:

ETS 300 417-2-1 [2]: "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment: SDH and PDH physical section layer functions".

K.3 Global statement of conformance of T12 layer

Are all mandatory capabilities implemented? (Yes/No) .....

NOTE: Answering "No" to this question indicates non-conformance to the ETS specification. Non-supported mandatory capabilities are to be identified in the ICS, with an explanation of why the implementation is non-conforming, on pages attached to the ICS proforma.

Answering "Yes" to this question indicates only that all the capabilities with the explicit status "m" are supported. It is not necessary to fill in the support column of the associated item.

K.4 T12 layer description

Table K.1: T12 electrical section layer function

Item	T12 electrical section layer function	Reference	Status	Support
1	The T12 Section Layer supports a T12 Connection function.	14.1	o	
2	The T12 Section Layer contains an T12 Trail Termination Source function (T12_TT_So).	14.2.1	o.101	
3	The T12 Section Layer contains an T12 Trail Termination Sink function (T12_TT_Sk).	14.2.2	o.101	
4	The T12 Section Layer contains an T12 Section to SD Adaptation Source function (T12/SD_A_So).	14.3.1	c101	
5	The T12 Section Layer contains an T12 Section to SD Adaptation Sink function (T12/SD_A_Sk).	14.3.2	c102	

o.101: It is mandatory to support at least one of these items -- at least one TT function present
c101: IF K.1/2 THEN m ELSE x -- a TT_So function should exist for A_So function
c102: IF K.1/3 THEN m ELSE x -- a TT_Sk function should exist for A_Sk function

K.5 T12 layer transmission tables

K.5.1 T12 layer data stream

Table K.2: T12 signal

Item	T12 signal	Reference	Status	Support
1	The T12_CI of the intra-station layer CP is an electrical, digital signal of defined amplitude and pulse shape.	13	m	

K.5.2 T12layer connection function, T12_C

Table K.3: T12 connection functionalities

Item	T12 connection functionalities	Reference	Status	Support
1	no requirement	13.1	n/a	

K.5.3 T12layer trail termination functions, T12_TT_So and T12_TT_Sk

Table K.4: Interface type

Item	Interface type	Reference	Status	Support
1	The interface is balanced with an impedance of 120 Ω.	table 10 of G.703 [8]	o.401	
2	The interface is coaxial with an impedance of 75 Ω.	table 10 of G.703 [8]	o.401	

o.401: It is mandatory to support exactly one of these items -- one characteristic impedance defined

Table K.5: Electrical characteristics for 120 Ω balanced interface

Prerequisite K.4/1: -- 120 Ω balanced interface

Item	Electrical characteristics for 120 Ω balanced interface	Reference	Status	Support
1	The pulse shape is specified in the form of a mask. The pulse shape is compliant to the mask in figure 21 of ITU-T Recommendation G.703 [8] and has a maximum peak voltage of 1,9 V0P and a minimum peak voltage of 1,0 V0P.	Figure 21 of G.703 [8] table 10 of G.703 [8]	m	
2	One balanced pair is used.	table 10 of G.703 [8]	m	
3	The impedance at the input port is resistive and equal to 120 Ω.	table 1 of G.703 [8]	m	
4	The return loss against 120 Ω of the output port is ≥ 15 dB at 2 048 kHz.	G.703 [8], section 10.3	m	

Table K.6: Electrical characteristics for coaxial interfaces

Prerequisite: (K.4/2) -- 75 Ω coaxial interface

Item	Electrical characteristics for coaxial interfaces	Reference	Status	Support
1	The pulse shape is specified in the form of a mask. The pulse shape is compliant to the mask in figure 21 of ITU-T Recommendation G.703 [8] and has a maximum peak voltage of 1,5 V0P and a minimum peak voltage of 0,75 V0P.	Figure 21 of G.703 [8] table 10 of G.703	m	
2	One coaxial pair is used.	table 10 of G.703 [8]	m	
3	The impedance at the input port is resistive and equal to 75 Ω.	table 1 of G.703 [8]	m	
4	The return loss against 75 Ω of the output port is ≥ 15 dB at 2 048 kHz.	G.703 [8], section 10.3	m	

K.5.4 T12 to SD adaptation functions, T12/SD_A_So and T12/SD_A_Sk

The ICS tables for these functions are specified in ETS 300 417-6-2 [23] and the reference specification is given in ETS 300 417-6-1 [17].

K.6 T12 layer defect, fault and performance monitoring tables

Prerequisite: K.1/3 – T12_TT_Sk present

K.6.1 Port status management

Table K.7: T12 port status mode process

Item	T12 port status mode process	Reference	Status	Support
1	The port status mode supports "not monitored" (NMON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
2	The port status mode supports "monitored" (MON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
3	The port status mode supports "automatic" (AUTO) status.	ETS 300 417-1-1 [1] subclause 8.5	o	
4	The AUTO status is left on clearing of dLOS.	ETS 300 417-1-1 [1] subclause 8.5	c801	
5	The port mode status is provisionable by the EMF.	13.2.2	m	

c1801: IF K.7/3 THEN m ELSE x

K.6.2 Defect detection and clearance criteria

Table K.8: T12 Loss Of Signal defect (dLOS)

Item	T12 Loss Of Signal defect (dLOS)	Reference	Status	Support
1	Loss of signal is detected when received amplitudes are less than or equal to the level Q (for E12 layer) as specified by ETS 300 417-1-1 [1], subclause 8.2.1.6 for a period from 10 to 255 UI.	13.2.2	m	
2	Loss of signal is not detected when received amplitudes are between the minimum accepted level and the level P (for E12 layer) for a period from 10 to 255 UI.	13.2.2	m	
3	Loss of signal is cleared when received amplitudes are greater or equal the level P (for E12 layer) as specified by ETS 300 417-1-1 [1], subclause 8.2.1.6 for a period from 10 to 255 UI.	13.2.2	m	

K.6.3 Consequent action activation and clearance criteria

Table K.9: T12 Trail Signal Fail action (aTSF)

Item	T12 Trail Signal Fail action (aTSF)	Reference	Status	Support
1	The aTSF signal is activated on detection of a dLOS defect in the trail termination sink function.	13.2.2, ETS 300 417-1-1 [1] subclause 8.2.2.5	m	
2	The aTSF signal is deactivated on clearance of a dLOS defect in the trail termination sink function.	13.2.2, ETS 300 417-1-1 [1] subclause 8.2.2.5	m	

Table K.10: Squelching

Item	Squelching	Reference	Status	Support
1	On activation of the T12_AI_SQLCH the output signal is switched of within 250 µs.	13.2.1	m	
2	On deactivation of the T12_AI_SQLCH the output signal is switched on within 250 µs.	13.2.1	m	

K.6.4 Defect correlation

Table K.11: Defect correlation

Item	Defect correlation	Reference	Status	Support
1	The cLOS is declared when dLOS defect is present and the port is the monitoring state (MON).	ETS 300 417-1-1 [1] subclauses 8.3.1, 8.2.1.6, 4.2.2	m	
2	The cLOS is cleared if dLOS defect is absent.	ETS 300 417-1-1 [1] subclause 8.3.1	m	
3	All the generated fault cause (cXXX) are reported to the EMF.	ETS 300 417-1-1 [1] subclause 8.1, figure 36	m	

Annex L (normative): ICS proforma for E0 electrical section layer

L.1 Identification of the implementation

In this ETS, an IUT, and of course the identification of an IUT refers to an E0 layer instance implemented inside the SUT.

Identification of the IUT and the SUT should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the ICS should be named as the contact person.

L.1.1 Date of the statement

.....

L.1.2 IUT identification

IUT name:

.....

.....

IUT version

Hardware version:

.....

Software version:

.....

Firmware version:

.....

L.1.3 SUT identification

SUT name:

.....

.....

Hardware configuration:

.....

SUT Software version:

.....

SUT Firmware version:

.....

Operating system:

.....

L.1.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

L.1.5 Client

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

L.1.6 ICS contact person

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

L.2 Identification of the ETS

This ICS proforma applies to the following standard:

ETS 300 417-2-1 [2]: "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment: SDH and PDH physical section layer functions".

L.3 Global statement of conformance of E0 layer

Are all mandatory capabilities implemented? (Yes/No) .....

NOTE: Answering "No" to this question indicates non-conformance to the ETS specification. Non-supported mandatory capabilities are to be identified in the ICS, with an explanation of why the implementation is non-conforming, on pages attached to the ICS proforma.

Answering "Yes" to this question indicates only that all the capabilities with the explicit status "m" are supported. It is not necessary to fill in the support column of the associated item.

L.4 E0 layer description

Table L.1: E0 electrical section layer function

Item	E0 electrical section layer function	Reference	Status	Support
1	The E0 Section Layer supports a E0 Connection function.	14.1	o	
2	The E0 Section Layer contains an E0 Trail Termination Source function (E0_TT_So).	14.2.1	m	
3	The E0 Section Layer contains an E0 Trail Termination Sink function (E0_TT_Sk).	14.2.2	m	
4	The E0 Section Layer contains an E0 Section to P0s Adaptation Source function (E0/P0s_A_So).	14.3.1	m	
5	The E0 Section Layer contains an E0 Section to P0s Adaptation Sink function (E0/P0s_A_Sk).	14.3.2	m	

L.5 E0 layer transmission tables

L.5.1 E0 layer data stream

Table L.2: E0 signal

Item	E0 signal	Reference	Status	Support
1	The E0_CI of the intra-station layer CP is an electrical, digital signal of defined amplitude and pulse shape.	14	m	

L.5.2 E0 layer connection function, E0_C

Table L.3: E0 connection functionalities

Item	E0 connection functionalities	Reference	Status	Support
1	no requirement	14.1	n/a	

L.5.3 E0 layer trail termination functions, E0_TT_So and E0_TT_Sk

Table L.4: Electrical characteristics

Item	Electrical characteristics	Reference	Status	Support
1	The pulse shape characteristics - including nominal peak voltages, nominal pulse width, ratio of amplitudes at the nominal centre width, ratio of widths at the nominal centre amplitude - is specified in the form of a mask. The pulse shape is compliant to the mask in figure 5 of ITU-T Recommendation G.703 [8] and to the relevant values in table 1 of ITU-T Recommendation G.703 [8].	Figure 5 of G.703 [8] table 1 of G.703 [8]	m	
2	The impedance at the output port is resistive and equal to 120 Ω.	table 1 of G.703 [8]	m	
3	The return loss against 120 Ω of the output port is greater than or equal to the minimum values.	ETS 300 166 [16] subclause 5.3	m	
4	One balanced pair in each direction is used.	G.703 [8], section 1.2.1.1.4	m	
5	The output signal balance is greater or equal to minimum values specified in ETS 300 166 [16], subclause 5.2.	ETS 300 166 [16] subclause 5.2	m	
6	The impedance at the input port is resistive and equal to 120 Ω.	table 1 of G.703 [8]	m	
7	The return loss against 120 Ω of the input port is greater than or equal to the minimum values.	G.703 [8], section 1.2.1.3	m	

L.5.4 E0 to P0s adaptation functions, E0/P0s_A_So and E0/P0s_A_Sk

Table L.5: Coding and regeneration of P0s signal

Item	Coding and regeneration of P0s signal	Reference	Status	Support
1	The E0/P0s_A_So function provides AMI encoding of the 64 kbit/s signal with and generates the octect structure.	G.703 [8], section 1.2.1.1.5	m	
2	A 64 kbit/s bit period is divided into four unit intervals.	G.703 [8], section 1.2.1.1.5	m	
3	A binary one is coded as a block of the following four bits: 1100.	G.703 [8], section 1.2.1.1.5	m	
4	A binary zero is coded as a block of the following four bits: 1010.	G.703 [8], section 1.2.1.1.5	m	
5	The binary signal is converted into a three-level signal by alternating the polarity of consecutive blocks.	G.703 [8], section 1.2.1.1.5	m	
6	The alternation in polarity of the blocks is violated every 8th block. The violation block marks the last bit in an octet.	G.703 [8], section 1.2.1.1.5	m	
7	The E0/P0s_A_Sk function regenerates the received signal, recovers bit timing and octect timing from it and decodes the AMI signal of the incoming electrical the 64 kbit/s E0 signal.	12.3.2	m	
8	The bit rate at the output port in free-running mode is 64 kbit/s ± 100 ppm.	G.703 [8], section 12.1.1.1	m	
9	The bit rate accepted at the input port is 64 kbit/s ± 100 ppm.	G.703 [8], section 12.1.1.2	m	
10	The signal accepted at the input port is as defined for output port but modified by the characteristics of the interconnecting coaxial pair (the attenuation follows a $\sqrt{f}$ law and the loss at 128 kHz is in the range 0 to 3 dB).	G.703 [8], section 1.2.1.3	m	
11	Immunity against signal reflection guarantees a no-error condition with a signal-to-interference ratio of 20 dB.	G.703 [8], section 1.2.1.3	m	
12	The port operates without any error when any combination of the following conditions apply to the input signal: - an input electrical signal amplitude with any value specified by ETS 300 166 [16]; - jitter modulation applied to the input signal with any value defined in figure 3 and table 2 of ITU-T Recommendation G.823 [11]; - input bit rate in the range 64 kbit/s ± 100 ppm; - the input signal has an interfering signal specified by ETS 300 166 [16]; - the input signal has a longitudinal voltage specified by ETS 300 166 [16].	14.3.2, G.823 [11], section 3.1.1 table 2 of G.823 [11] figure 3 of G.823 [11]	m	
13	The E0/P0s_A_So function does not add any jitter. The output jitter is the combination of the jitter generated and transferred via the client layer	14.3.1	m	
14	AIS generated by the E0/P0s_A_Sk function replaces the regular signal when a defect is detected.	14.3.2	m	

L.6 E0 layer defect, fault and performance monitoring tables

L.6.1 Port status management

Table L.6: E0 port status mode process

Item	E0 port status mode process	Reference	Status	Support
1	The port status mode supports "not monitored" (NMON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
2	The port status mode supports "monitored" (MON) status.	ETS 300 417-1-1 [1] subclause 8.5	m	
3	The port status mode supports "automatic" (AUTO) status.	ETS 300 417-1-1 [1] subclause 8.5	o	
4	The AUTO status is left on clearing of dLOS.	ETS 300 417-1-1 [1] subclause 8.5	c601	
5	The port mode status is provisionable by the EMF.	14.2.2	m	

c1801: IF L.6/3 THEN m ELSE x

L.6.2 Defect detection and clearance criteria

Table L.7: E0 Loss Of Signal defect (dLOS)

Item	E0 Loss Of Signal defect (dLOS)	Reference	Status	Support
1	Loss of signal is detected when received amplitudes are less than or equal to the level Q as specified by ETS 300 417-1-1 [1], subclause 8.2.1.6 for a period from 10 to 255 UI.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	
2	Loss of signal is not detected when received amplitudes are between the minimum accepted level and the level P for a period from 10 to 255 UI.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	
3	Loss of signal is cleared when received amplitudes are greater or equal the level P as specified by ETS 300 417-1-1 [1], subclause 8.2.1.6 for a period from 10 to 255 UI.	ETS 300 417-1-1 [1] subclause 8.2.1.6	m	

L.6.3 Consequent action activation and clearance criteria

Table L.8: E0 Trail Signal Fail action (aTSF)

Item	E0 Trail Signal Fail action (aTSF)	Reference	Status	Support
1	The aTSF signal is activated on detection of a dLOS defect in the trail termination sink function.	14.2.2, ETS 300 417-1-1 [1] subclause 8.2.2.5	m	
2	The aTSF signal is deactivated on clearance of a dLOS defect in the trail termination sink function.	14.2.2, ETS 300 417-1-1 [1] subclause 8.2.2.5	m	

Table L.9: E0 Server Signal Fail action (aSSF)

Item	E0 Server Signal Fail action (aSSF)	Reference	Status	Support
1	The aSSF is activated under reception of a AI_TSF.	14.3.2, ETS 300 417-1-1 [1] subclause 8.2.2.4	m	
2	The aSSF signal is deactivated when the defect(s) which caused the aSSF generation is(are) no longer active and there are no other defects active.	14.3.2, ETS 300 417-1-1 [1] subclause 8.2.2.4	m	

Table L.10: Alarm Indication Signal action (aAIS)

Item	Alarm Indication Signal action (aAIS)	Reference	Status	Support
1	AIS is applied to the output data within 250 µs after AI_TSF reception.	14.3.2	m	
2	AIS is removed upon termination of the AI_TSF condition within 250 µs.	14.3.2	m	

L.6.4 Defect correlation

Table L.11: Defect correlation

Item	Defect correlation	Reference	Status	Support
1	The cLOS is declared when dLOS defect is present and the port is the monitoring state (MON).	4.2.2, ETS 300 417-1-1 [1] subclauses 8.3.1, 8.2.1.6	m	
2	The cLOS is cleared if dLOS defect is absent.	ETS 300 417-1-1 [1] subclause 8.3.1	m	

Annex M (informative): Bibliography

- ETS 300 147 (1993): "Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH); Multiplexing structure".

- ITU-T Recommendation G.826 (1993): "Error performance parameters and objectives for international, constant bit rate digital paths at or above the primary rate".

- ETS 300 462: "Transmission and Multiplexing (TM); Generic requirements for synchronization networks".

History

Document history			
August 1996	Public Enquiry	PE 112:	1996-08-19 to 1996-12-13
August 1997	Vote	V 9742:	1997-08-19 to 1997-10-17
November 1997	First Edition		

ISBN 2-7437-1774-2
Dépôt légal : Novembre 1997